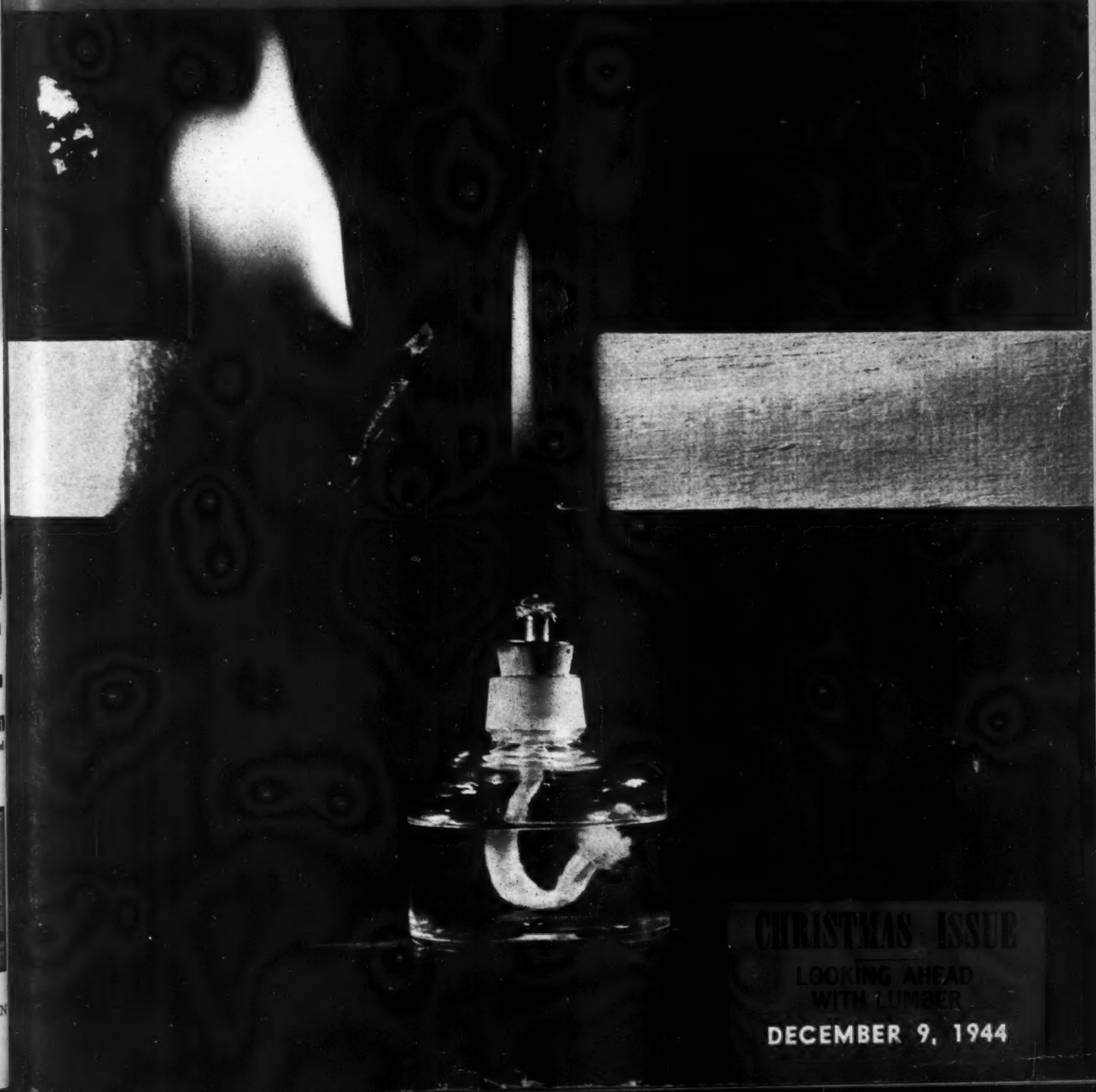
FORESTRY

DEC 1 2 1944

American Lumberman

THE NATION'S AUTHORITY ON LUMBER AND BUILDING MATERIALS



CHRISTMAS ISSUE

LOOKING AHEAD WITH LUMBER

DECEMBER 9, 1944

Step-up Your War Output With Present Man Power

Others are getting more logs in—faster—cheaper—with same or less manpower—after putting "Loggers Dream" on their job. Let "Loggers Dream" solve your manpower problem—reduce your logging costs—increase your net profit.

"Loggers Dream" travels to the job at truck speed. Quick and easy to set up or take down. Only 3 men to the unit. Yards up to 500 feet from bad spots where livestock or tractive machines fail. Plenty of power. Speed loading of trucks or R. R. cars. The operators listed at the right know from experience the merits of the "Loggers Dream." Re-orders are the final proof.

Investigate! Find out today how "Loggers Dream" will save you money—solve your manpower problem—step-up your war output and equip you to handle the flood of orders after the war.

Send a postcard for complete "Loggers Dream" Facts.

TAYLOR'S MACHINE WORKS
Louisville, Mississippi

Some Owners of "Loggers Dream"

W. A. Belcher Lbr. Co., Birmingham (2 machines)
Chicago Mills Lbr. Co., Helena, Ark.
Dixie Veneer Co., Shamrock, Fla.
Gulf Lbr. Co., Mobile, Ala. (2 machines)
Beaumont Veneer Co., Beaumont, Miss. (2 machines)
Tuscaloosa Veneering Co., Meridian, Miss. (2 machines)
McKnight Veneer Co., Helena, Ark. (2 machines)
E. L. Bruce Co., Memphis, Tenn.
Tremont Lbr. Co., Rochelle, La. (5 machines)
J. M. Jones Lbr. Co., Natchez, Miss. (3 machines)
W. P. Brown Lbr. Co., Fayette, Ala. (2 machines)
Allen Cooperage Co., Jackson, Miss. Branch of Grief Bros., Cleveland, O. (20 machines)
Goodyear Yellow Pine Co., Picayune, Miss. (4 machines)
Columbus Lbr. Co., Brookhaven, Miss. (4 machines)
Ingram-Day Lbr. Co., Yarbo, Ala.
Carr Lbr. Co., Pisgah Forest, N. C.
Vredenburgh Saw Mill Co., Vredenburgh, Ala. (2 machines)
The Mengel Co., Baton Rouge, La. (2 machines)
Howe Lbr. Co., Helena, Ark. (2 machines)
J. W. Wells Lbr. Co., Belhaven, N. C.
Paducah Sawmill & Logging Co., Paducah, Ky.
D. L. Fair Lbr. Co., Louisville, Miss. (3 machines)
LeMieux Lbr. & Log Co., New Orleans, La.
Builders Lbr. & Supply Co., Opelika, Ala.
W. W. Caruth, Jr., Dallas, Tex.
Milliard B. Wingate, Lake City, Fla.
Vestal Lbr. Co., Knoxville, Tenn.
Foster Lbr. Co., Fostoria, Tex.
Geo. C. Griffith Stave Co., Springfield, Mo.
Nichols Veneer Co., Valdosta, Ga.

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A HIGHLIGHTS COLUMN in the usual sense would be out of place in this special issue of the AMERICAN LUMBERMAN pointed to the theme *Looking Ahead With Lumber*. It is our intention that the entire issue be a highlight for the industry, and it would be difficult to pick out any one article that will be of greater interest than the others.

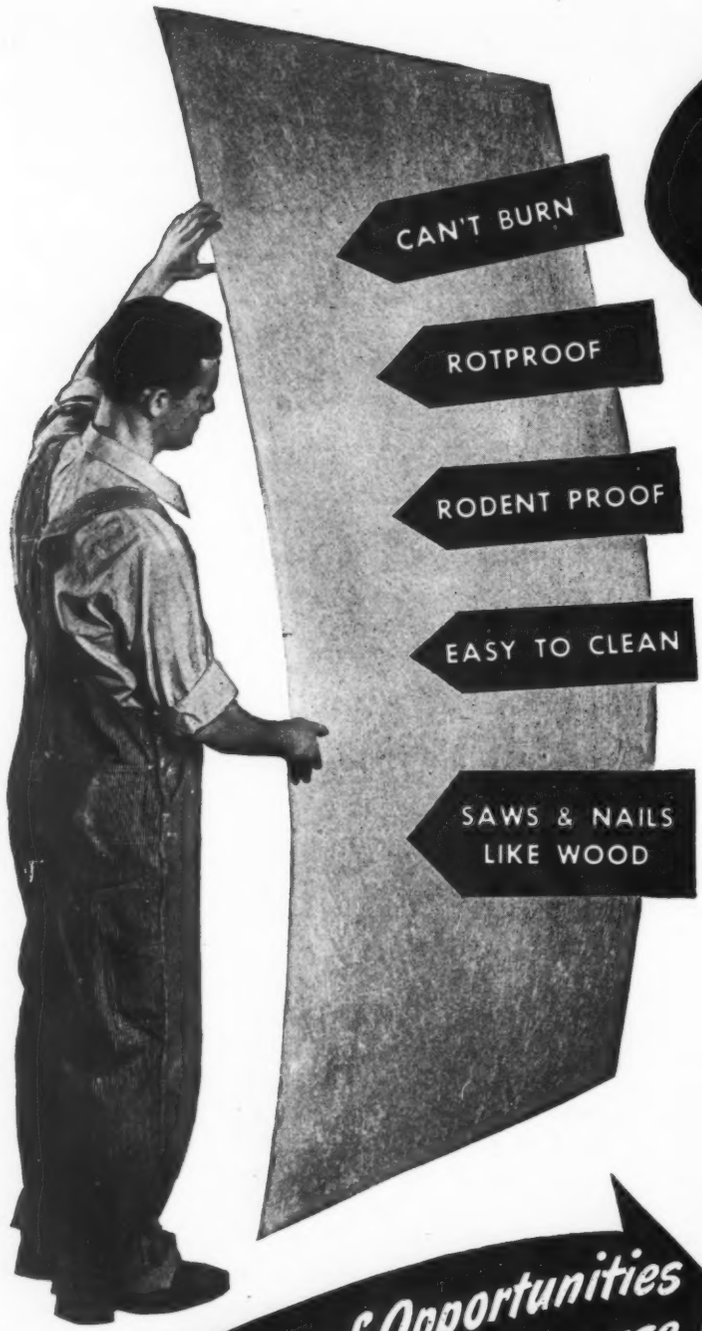
Our purpose with this issue has been threefold: (1) to sketch the principal markets that will confront the lumber industry when it can again begin to supply civilian needs; (2) to sum up in one volume the progress that has been made in recent years which will improve lumber in its natural state, and to describe new items which have forest products as their basis; (3) to give lumbermen a comprehensive summary of the wood waste utilization problem, approaching it realistically, from an economic standpoint.

More and more the industry is looking to the scientific laboratory for the answer to many of its problems. The fact reflects no particular glory on the industry—it is a step prompted by necessity rather than foresight. But it is a step that has been taken in a small way, and will be taken in a much larger way in the future. The laboratory is today the foundation to marketing and selling.

But never let us lose sight of the fact that the laboratory is no more than the foundation. It is not the structure itself; and that structure must be supplied by individual lumbermen in every part of the nation.

Scientists may bring forth miracles in wood that could revolutionize the world, and yet they cause not a stir anywhere if the working men of the industry lack interest in these developments and fail to give them the test that will prove their economic feasibility.

Laboratories are not production organizations. They were never intended to be; and they can carry the ball only so far — only up to the point where an item is ready to go into production. Then it is up to the lumbermen of the nation to invest their time and their talent and their money in the next step—that of bringing the wonders of the laboratory to the consuming public. That's where lumbermen will have to pick up the ball today, tomorrow, and after the war.

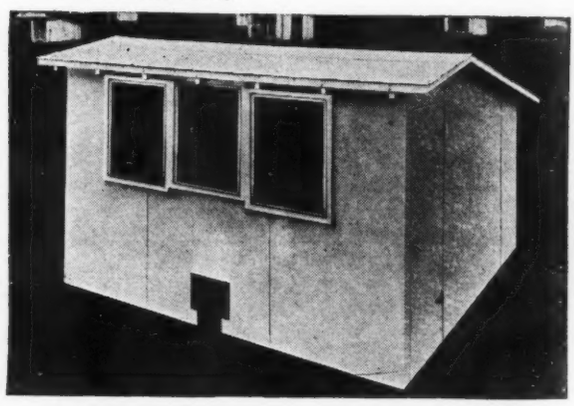


Yes!

Opens up an entirely new market for dealers and builders. 12 years' service in peace and war prove it a product of exceptionally high quality.

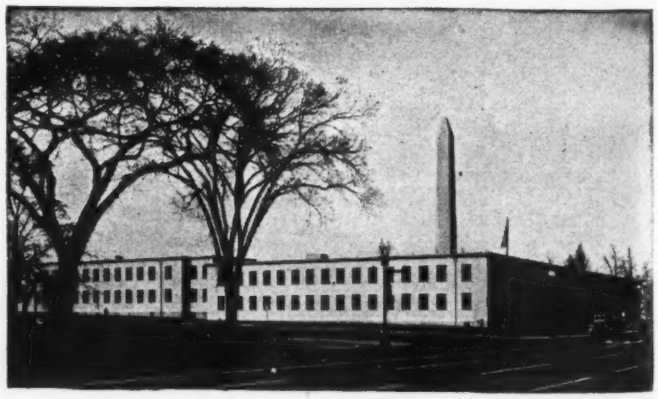
Dozens of Opportunities for Farm and Home use

FARM BUILDINGS are better when built of Flexboard. No rot or decay . . . no damage from rodents . . . added fire safety.



A Vast Market in Business and Industry

OFFICE BUILDINGS, stores, etc., can be built economically with Flexboard exteriors. Stone grey color makes attractive appearance.



FLEXBOARD *is back on the job!*

DRAFTED early in the war for critical military construction, Johns-Manville Asbestos Flexboard is back on the job, ready to go to work for you and your customers. Its many features will suggest a wide variety of opportunities . . . jobs which no other product could do as well. And its excellent handling qualities and workability make it a pleasure to use.

Formed of asbestos and cement, Flexboard is pressed and then *re-pressed* under terrific pressure. The result is a strong, tough, durable yet flexible sheet . . . one that takes nails easily without drilling holes . . . one that works easily with ordinary tools.

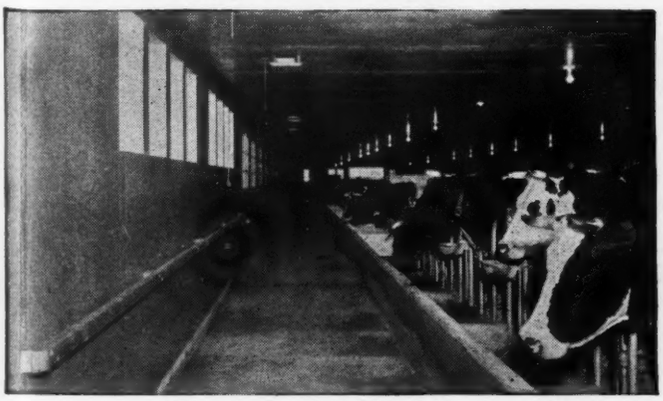
Flexboard can be used indoors or outdoors. It *never* needs to be painted and it is unaffected by freeze and thaw. It will not rot or rust, and it is fireproof. Because of its smooth hard surface it is easy to keep clean and sanitary.

Pictured below are just a few of the types of building jobs on which you can use Flexboard to advantage. Dozens of others will occur to you when you see the material itself. Why not write us for full particulars and prices. Address, Johns-Manville, 22 East 40th Street, New York 16, N. Y.

JOHNS-MANVILLE JM PRODUCTS

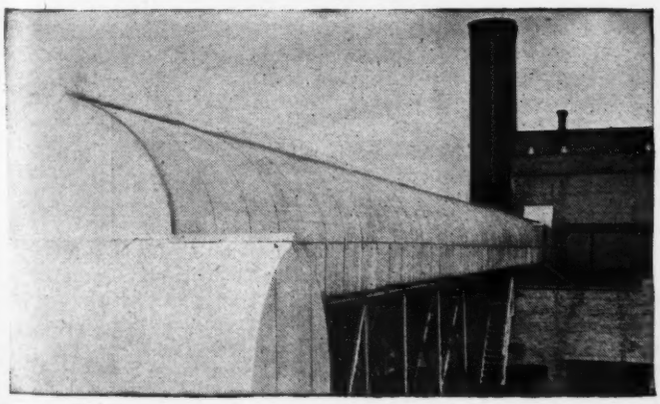
Johns-Manville *Asbestos* Flexboard

FARM INTERIORS like dairy barns and milk houses are easy to keep spic and span when lined with Flexboard. No paint or whitewash needed.

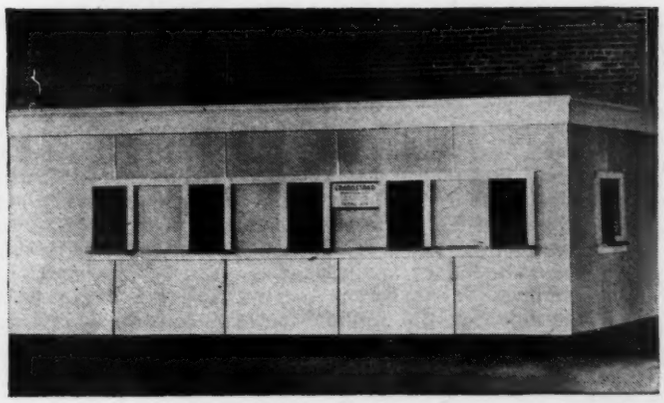


GARAGE LINING, and also for laundries, workshops, boiler rooms at home . . . Flexboard is fireproof, resists steam and hot water.

INDUSTRY uses Flexboard in many ways. Here it provides a hood for an outdoor conveyor. Inside, it's ideal for washrooms offices, etc.



TICKET BOOTHS, roadside stands, counters, etc., are more durable, more economical to maintain when built of Flexboard.



A Lumber Dynasty Passes

The Red River Lumber Co., Westwood, Calif., has announced the sale of the town of Westwood and all plant operations and timberlands adjacent to Westwood to the Fruit Growers Supply Co. of Los Angeles.

Preliminary negotiations for the sale of the Red River Lumber Co. and its properties and plant have been under way since last May, but the Fruit Growers Supply Co. did not exercise its option until Nov. 30. Possession by the new owners will be taken Dec. 15.

The deal will mark the passing of the logging and lumber dynasty founded by T. B. Walker, who transferred his logging and lumbering operations from Minnesota to California in 1913, at which time Westwood was created. Two generations of Walkers had cut white pine in Minnesota and a number of the present 2,500 employees moved with the company to California.

Fruit Growers Supply Co., operating sawmills at Hilt and Susanville, Calif., is the supply affiliate of the California Fruit Growers Exchange of Los Angeles, which markets about 75 percent of the State's fresh citrus crop. The deal will assure the citrus growers an adequate future supply of box shook. However, operating and sales policies relative to the Westwood plant can not be determined by Fruit Growers Supply Co. until conditions are known following the actual transfer of the properties.

New-Quarter Lumber Allotments

Over-all allotments of lumber for the first quarter of '45 amount to 8,231 million feet. This allotment is nearly ten percent in excess of estimated supply; a risk which the WPB was willing to take, since experience indicates that about this amount will fail to materialize in orders on suppliers. The amount of lumber allocated for the first quarter of '45 is 7.7 percent less than that allocated for the last quarter of '44. Class 1 consumers are to receive, next quarter, 4,699 million feet. The War Food Administration is allotted, for construction, maintenance and repair of farm buildings (exclusive of dwellings) the total of 276 million feet. The NHA gets 262 million feet. The amount for civilian construction, maintenance and repair, including farm dwellings, is 343 million feet.

Officials of the lumber division are agreed that all lumber will be tight until at least the beginning of the second quarter of next year. Some officials think the stringency will continue for longer than that. A graphic chart, set up to make the usual allowances for seasonal variations but drawn to indicate a total production of 34 billion feet in '44, has been kept with the actual monthly production marked in relation to the median line. For the first eight months, actual production did not vary too widely from the estimates; but the figures for September show a drop in production of 14.9 percent; so serious that there is little if any chance of catching up by the end of the year.

Restore Premium Prices on West Coast Logs

Amendment No. 18 to RMPR No. 161—West Coast Logs—restores premium prices for Noble fir aircraft grade logs to encourage special selection of those logs for increased needs in the military aircraft production program. Prices are restored at request of WPB, made because of an unforeseen increase in requirements submitted by Army Air Forces.

Amendment also includes several other pricing changes for West Coast Logs, including changes brought about by cancellation of additions that were allowed for overtime work.

New ceiling prices for short lengths of logs are also established to prevent penalizing loggers for culling out shorter length logs.

Amendment became effective Nov. 25.

Hardwood Plywood Price Regulation

Specific dollar-and-cent maximum prices for manufacturer sales of commercial hardwood plywood, used for industrial panels to make furniture, radio cabinets, die-boards, automobile floor boards, etc., are established in a new regulation covering hardwood plywood, which was issued Dec. 2 by OPA.

The new regulation, MPR No. 568—Hardwood Plywood—effective Dec. 6, does not change the present general price level.

Amendments to L-335

Direction 6 to Order L-335 was amended Nov. 18 and became effective Nov. 23, in order to provide hardwood lumber required for military cargo truck bodies and for cots. Prohibits sale, delivery, or transfer of certain grades and species of hardwood lumber except on orders of Central Procuring Agency, or permitted as the result of appeals.

Direction 7 to Order L-335 was also amended Nov. 18, to permit lumber not controlled by Directions 1 through 6 and certain grades in the species that are controlled by Directions 1 through 6 to move on uncertified and unrated orders provided such delivery does not interfere with the filling of certified orders.

Insect Screen Cloth in Short Supply

Because insect screen cloth is in greater demand for protection of our military personnel, it is anticipated the supply for non-military uses will be so short through the greater part of 1945 that many sections of the country will probably not receive more than one-fourth or one-fifth of their normal purchases for maintenance and repairs and only the minimum required for essential approved new construction. Therefore distributors, dealers, and storekeepers are urged to begin self-rationing of their current supplies to their customers for only absolutely essential needs.

Overloaded Freight Cars

Service Order 255, issued by Interstate Commerce Commission, and effective Nov. 22, applies to overloaded freight cars. Orders railroads to transfer excess freight to another car or obtain other disposition of excess freight from consignor. Also sets up procedure for charges in overload cases.

Rubber Conservation Order Amended

Rubber Conservation Order R-1 has been reprinted with various amendments. Neoprene types of synthetic rubber have been removed from allocation control and may now be consumed without limitation as to

amount in any permitted product; Veterans Administration requirements have been included in exceptions previously limited to the Army, Navy, and U. S. Maritime Commission; and consumption of butyl is now permitted in manufacture of truck and bus tubes, sizes 8.25-16 to 9.00-24 inclusive, for both Government and civilian orders.

Award Presentation

Presentation of the award to the Southern Pine Assn., New Orleans, La., by the American Trade Association Executives for outstanding industry service during two war years —1943-1944—was made by Amos G. Taylor, director of the Bureau of Foreign & Domestic Commerce of the

H. C. Berckes, left, receiving Certificate of Award from Amos G. Taylor.

U. S. Department of Commerce, to H. C. Berckes, secretary-manager of SPA, at ceremonies during the annual convention of A.T.A.E. in New York City on Nov. 9.

The award, which is in the form of a certificate, will be duplicated and sent to all those in the industry who helped make the splendid performance of the Southern Pine industry to the war effort possible, Mr. Berckes concluded. (See page 60, Sept. 16, 1944, issue of American Lumberman.)

Transfer Regional Office

Transfer of the Southern Pine Assn. regional office from Norfolk, Va., to Raleigh, N. C., was decided at a meeting of subscribers of Virginia, North Carolina, and South Carolina on Nov. 16 in Raleigh, attended by President W. B. McNeal, Vice President W. H. Burruss, and Secretary-Manager H. C. Berckes. An additional office also will be opened in Macon, Ga.

Expansion program of association's services necessitates closer contact with subscribers and includes employment of two assistant foresters, one of whom will make his headquarters in the Raleigh-Macon area.

Western Pine Sales Further Restricted

Further restrictions on delivery and receipt of Western pine lumber have been set up through the issuance of Direction 2a to Order L-335. For purposes of this direction, Western pine means Idaho white pine, Ponderosa pine, and sugar pine.

Requirements for Western pine lumber for the first quarter of 1945 exceed estimated supply by more than three-quarters of a billion feet.

Direction 2a implements the WPB allocation of lumber for the first quarter of 1945. This allocation designated claimants—some eight in number, including the Army and Navy—that may receive Western pine lumber. All other consumers must apply for specific WPB authorization.

This direction applies to sawmills cutting 10,000 feet a day of any kind of lumber. Mills cutting less than that amount may sell on uncertified orders, if these deliveries do not interfere with the filling of certified orders.

Mills coming under the direction may fill orders for Western pine lumber, received after Dec. 2, only if the orders carry the certifications (for consumers and distributors respectively) that are prescribed in the direction. Mills to which the direction applies are allowed, under certain conditions, to fill orders accepted before Dec. 2. They may do this, up to and through Dec. 31. But after that date they may not fill orders, except on the specified certification, even though the orders were accepted prior to Dec. 2.

The direction does not apply to Western pine lumber received by a retail distributor prior to Dec. 31; nor does it apply to lumber placed in transit by the supplier before Dec. 31. Otherwise the sales and deliveries of Western pine lumber must bear the certification specified in the direction. Note that these certifications are in **addition** to the regular certificates required by consumers and distributors under Order L-335.

Elected Secretary

President John L. Roe of Southern Cypress Manufacturers' Assn. has announced the unanimous election of J. A. Prestridge as secretary, to succeed Ben R. Ellis, who resigned to become secretary-manager of Southern Hardwood Producers, Inc., Memphis, Tenn. Mr. Prestridge became associated with the Cypress association in 1927 and for the past thirteen years has served as assistant secretary. Southern Cypress Manufacturers' Assn. maintains offices in the Barnett National Bank Building, Jacksonville, Fla.

J. A. Prestridge

Scheduled Meetings

Dec. 14—Carolina - Virginia Lumbermen's Club, Sir Walter Hotel, Raleigh, N. C. Annual.

Dec. 14—Northeastern Wood Utilization Council, Hotel Manger, Boston, Mass. Regular quarterly meeting.

Dec. 16—Nylta Club, Hotel Belmont-Plaza, 48th & Lexington Ave., New York City. Annual Christmas party.

Dec. 20—Quebec Province Wholesale Lumber Association, Windsor Hotel, Montreal, Canada. Annual.

Carolina-Virginia Club to Hold Annual

The annual meeting of the Carolina-Virginia Lumbermen's Club will be held at the Sir Walter Hotel, Raleigh, N. C., on Dec. 14, at which time new officers and directors will be elected. Important discussions will be followed by a turkey banquet and Secretary H. W. Sholar urges all members to attend.

District Court Upholds Lumber Company

The United States Circuit Court of Appeals for the Fifth Circuit handed down an opinion on Nov. 10, upholding the Youngerman-Reynolds Hardwood Co., Inc., Montgomery, Ala., in a complaint filed by the administrator of the Wage and Hour Division in that district, charging the lumber company with violating the Fair Labor Standards Act in its method of paying lumber stackers.

Before the trial date, the company entered into contracts with its stackers modeled on the contract upheld by the U. S. Supreme Court in the

(*Continued on page 77*)

Merry Christmas
Since well before Pearl Harbor Reynolds & Manley have been in the front ranks of the home front in supplying lumber for defense and war needs . . . and Reynolds & Manley is a mighty good name to tie to for your post-war lumber requirements.
PINE
HARDWOODS
CYPRESS
Reynolds & Manley Lumber Co.
Savannah, Georgia

EDITORIAL

Our Fourth Wartime Christmas

For millions of Americans on the battlefronts of the world the Christmas of 1944, our fourth consecutive wartime Christmas, will be just another day of bitter strife during which neither the Japs nor the Germans can be expected to relax in the vigor of their defense against the ever increasing advances of the Allies. It will be a day of vigilance in fox holes, a day of bombing enemy installations, a day of hand-to-hand combat, a day of patrolling hostile waters.

For some of our men and women in uniform the 1944 celebration in honor of the Prince of Peace will be a day of bleeding, of suffering, and of death.

For those of us at home it should be first a day to take stock of ourselves, for each of us to ask himself if he is worthy of the sacrifices that are being made to protect him and to insure his future well being. By the time Christmas dawns a half million men and women of the Army and Navy will have been killed, wounded, taken prisoner, or reported missing in action. An unnumbered and unsung host of middle age and elderly civilians, who, but for the war, would have slowed down, will have perished at home from strain and overwork. Each of us, in light of these facts, should ask himself if he is doing his part, if he is worthy of the sacrifices being made on both the battle fronts and the home front.

Then, having asked the question, what kind of Christmas shall we make it? We of the AMERICAN LUMBERMAN believe it should be a merry Christmas, as merry as each of us in his own way can make it. In those homes in which the family is intact, and in which all can gather around the festive board it can and should be merry. It is for the perpetuation of the traditional American Christmas and all of the inspired good will that underlies it that American boys are fighting and dying. Let those who can, make merry in the traditional American way that those who have died and those who are maimed and scarred, and those who are fighting will not have sacrificed in vain.

In those homes from which sons are absent, in training, fighting on a remote front or recuperating from illness or battle wounds, let this Christmas be one of hope and of faith. Let it match the hope and faith of the absent son, and let it be the kind of Christmas he thinks it is and wants it to be back home.

And in those homes from which a son is gone and is now numbered among those who will never return in body be sure that he has returned in spirit to stay forever. Be sure that, having given his life for the well-being of all men, he will want no mourning for his passing. Be sure that he has become a living, vital part of that force for good in the world that somehow survives our individual and mass transgressions against our fellow men. In the homes where a gold star has taken the place of the blue let this Christmas be one of rededication to the principles of peace on earth and good will to men; to the principles for which a fine young American laid down his life.

We know that it is futile to wish a merry Christmas to men who will be locked in battle on Christmas day, and we know that there can be no universally merry Christmas at home. The management and staff of the AMERICAN LUMBERMAN therefore extends the season's greetings, and expresses the hope that all of our friends may each in his own way be enriched at this Christmas season.

THE RETAIL Markets FOR LUMBER

HOME

ESTIMATES of annual postwar building volume run into figures followed by six digits. Even the staid Twentieth Century Fund sets demand "in excess of 1,000,000 units per year for at least ten years." Lumber dealers themselves, the men who are perhaps the closest to the potential home builder, have indicated a belief that the first postwar year will see the erection of 546,000 new homes in the price range from four to seven thousand dollars. They peg home improvement jobs at 1,701,000 for the first postwar year.

These seem to us to be more reasonable figures, especially in view of past peak building years like 1925 and 1926 when around 900,000 new homes were built annually. It is further substantiated by a survey and estimate made by F. J. Hallauer for the USDA in 1939, before the war became a factor in the homebuilding picture. It predicted an average annual home building volume of 450,000 living units through the years. The damming up of the market by the war, and the easy money pumped into the national economy by war could reasonably be expected to boost building to 546,000 living units for some years, later leveling off perhaps to the 450,000 average.

What does all this mean to lumbermen and the market for lumber? To translate the above figures into board feet involves a number of factors. It is true that lumber, per living unit has declined appreciably in the past 30 years—but this is due principally to the development of multi-family structures of so-called fireproof construction. But the figures cited above are the prospectus for one and two family dwellings and are beyond the pale of the multi-family market.

Surprising as it may seem, the exterior surface of a building uses only about ten percent of the materials, so whether a house has brick or stucco or wood siding changes its lumber consumption factor only by about 1/10. Conversion factors show that board feet of lumber used per thousand cubic feet of house volume are as follows: All Wood Construction—1,150; Veneer Over Frame—1,025; Masonry Wall—830.

Here is how the entire picture shapes up:

Lumber used in dwellings of frame construction, in board feet, per thousand cubic feet of volume

Framing	440
Sheathing	325
Flooring	110
Finish (trim, millwork)	150
Siding (if wood)	125
	1150

Other trends in construction methods will affect this figure. Plywood and other types of panel board sheathing are expected to move into the building picture in a large way when new home construction blooms again. Of course plywood cannot be said to be a detraction from the lumber industry as it is so definitely a forest product. Sheathing makes up a greater factor—325 board feet per 1000 cubic footage of construction.

Remodeling and modernization jobs in the home are another tremendous market for lumber. Averaging the work of lumber dealers and contractors for this type of endeavor, it is found that about five board feet of

FARM

AS SOON AS labor and materials become available, the biggest boom in farm construction that this country has ever seen will get under way. Six million farmers will be in the market for building materials, many of them making their first substantial investment in remodeling or new construction since the last war. Their ranks will be swelled by the G. I. Joes and their brides who hope to carve a simple, peaceful existence out of a few acres of soil; the factory worker who wants to keep a few chickens and a cow as a hedge against depression, and the hoards of city families that have dreamed of returning to the soil.

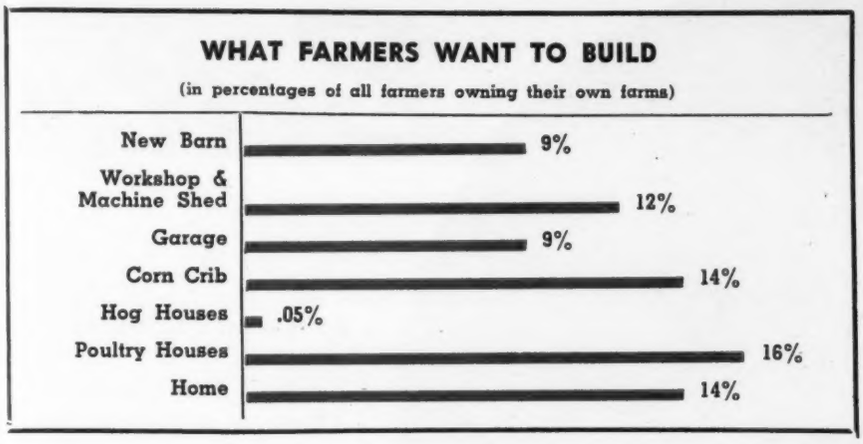
Agriculturalists and economists will tell G. I. Joe, the factory worker and city dweller to keep off the farm because their dreams and hopes will not be realized in most instances. Farming, they will be told, is a precarious business, that demands more learning and understanding than almost any other in the world. Some of these people will take this advice and stay off the soil, but millions will go ahead and gamble because they have the money to back up their ideas. G. I. Joe will have his mustering out pay, a few war bonds, a government loan and the money his "intended" has saved working in a war plant. The factory worker will have his bonds and savings from long hours of overtime.

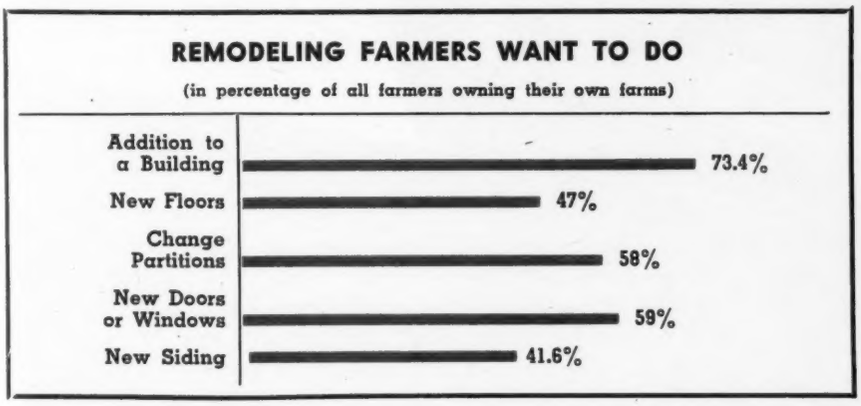
All of these people will provide a ready market for building materials in every country town. They will want suburban comforts so they will remodel the farm house or build a new one. They will try to make over their farm buildings and will buy machinery. Unfortunately, this business will be strictly postwar boom business and many of these new farmers will be gone after the second or third crop is harvested. But someone will sell them what they want to buy, so their needs must be considered in any plans a dealer may make for the postwar era. While this class of buyer will be spending money, there will be a hazard in this business. Over-extention of credits can wipe out all the profits that will accrue from it, but intelligent handling of credits will make this a profitable business.

The regular farm market will boom too, and this will be a stable business backed by real assets and a background in successful farming. During the war years these regular farmers have liquidated mortgages until today the mortgage debt is estimated to be only slightly higher than in 1914. On January 1, 1944 the total farm mortgage debt was estimated to be only $5,650,000,000 or down 52 percent from the all-time 1929 high of $10,785,621,000.

In addition, these farmers have money in the bank. The Federal Reserve System reported that demand deposits in country banks on January 1, 1944, were at 10½ billion dollars, an increase of 200 percent since Pearl Harbor, or 7½ times what they were at the lowest level in 1933. This cash is augmented by a sizable investment in war bonds. Savings were increased this year because we have had another record crop and prices were good, so we can safely figure that another billion has accumulated in savings or reduction of indebtedness. So as of today farmers have 15½ billion dollars available. Add to this the credit value represented in paid up mortgages that can be figured conservatively at 3½ billion and there is a total of 19 billion available for postwar spending.

When all this accumulation of money is turned loose in the country, the small town merchants will be doing a land office business. Economists figure that this boom will last at least three years and that it may go on for ten. During the first year the bulk of the business will undoubtedly come from remodeling and repair. Farmers will be taking care of the emergency re-





pairing that they were not able to do during the war. High on the list is reroofing. The War Production Board survey of this spring indicated that 1 out of every 3 farmers was in the market for a new roof and that three-quarters of all farmers needed some type of repairs for their producing plant. New doors, sash and siding were high on the list of needs. A very recent survey being made by the University of Illinois and the American Zinc Institute in Champaign County, Illinois, indicates that three-fifths of all barns in that county are over 50 years old and that these are 80 percent depreciated by the farmers' own estimate. Champaign County is a better than average farming county, so it might serve as a conservative barometer of the condition of all barns in the country. This depreciated condition of barns is not unusual, it is merely an indication of the obsolescence present in most of our farm buildings. In spite of this obsolescence, relatively few of these old structures will be torn down to make way for new construction. They will be patched up and rearranged so they will serve another generation. A cross section of various state, federal and private of barns is not unusual; it is merely surveys indicates that only nine percent of the farmers that own their own farms plan to build new barns in the postwar period. These farmers plan an average barn that will be 36x70 in floor size. If these were built to the standard of the Midwest Plan Service, they would require 11,028,052,700 b. f. of lumber.

Next to new barns, the farmers want a combination workshop and machine storage building. They realize that the newer tractors and farm machines have many delicate parts that quickly go out of adjustment. These machines cannot be left idle in the fields, if they are to pay for themselves and be in good operating condition when they are needed. Twelve percent of our owner operated farms plan to build a workshop and machine storage building. Surveys indicate that the average size planned is 22x65. If patterned after a widely accepted Mid-West Plan Service drawing, these

(*Continued on page 76*)

lumber per dollar spent gives a fair appraisal in lumber demand. Returning to our lumber dealers' estimate of what the business of his first postwar year will be it is found that the 1,701,000 estimated improvement jobs will cost in the neighborhood of $787,560,000, or yield a market for nearly four billion feet of lumber. With new homes coming into existence at a high rate, the repair market is liable to drop in the years immediately following, and then perhaps rise again over a 15 or 20 year period.

RESEARCH

The Builder of Markets

By C. A. Rishell

Director of Research, American Forest Products Industries

ONE HUNDRED and fifty years ago the majority of products used by man were totally or partly of wood. Wood dishes were common. Wood shoes, weapons, houses, vehicles, fireplace chimneys, rakes, plows, hinges, locks and other miscellaneous hardware, clocks, submarines (1776 model), battleships, bridges, buckets, pumps, fire engines, ventilating fans, waterwheels, hand luggage, telescopes, carpenters' tools, factory machinery and literally thousands of other items which are now made of some substitute material, were made of wood. The reason for the gradual but steady evolution may be found in the dictionary definition for the word research; "continued and diligent investigation, a systematic study of certain phenomena by the experimental method." The application of the meaning of this definition is the tool which competitors have used for our loss and their gain.

The present use of substitute materials did not come about until the efforts of research had made them over.

Admittedly, some of the markets held by wood have rightfully passed on to products having better inherent qualities for the specific use. The passing of the stick and mud chimney should not disturb the equanimity of the most ardent wood enthusiast. The wooden rails used on the early railroads have no place in the modern scheme of things.

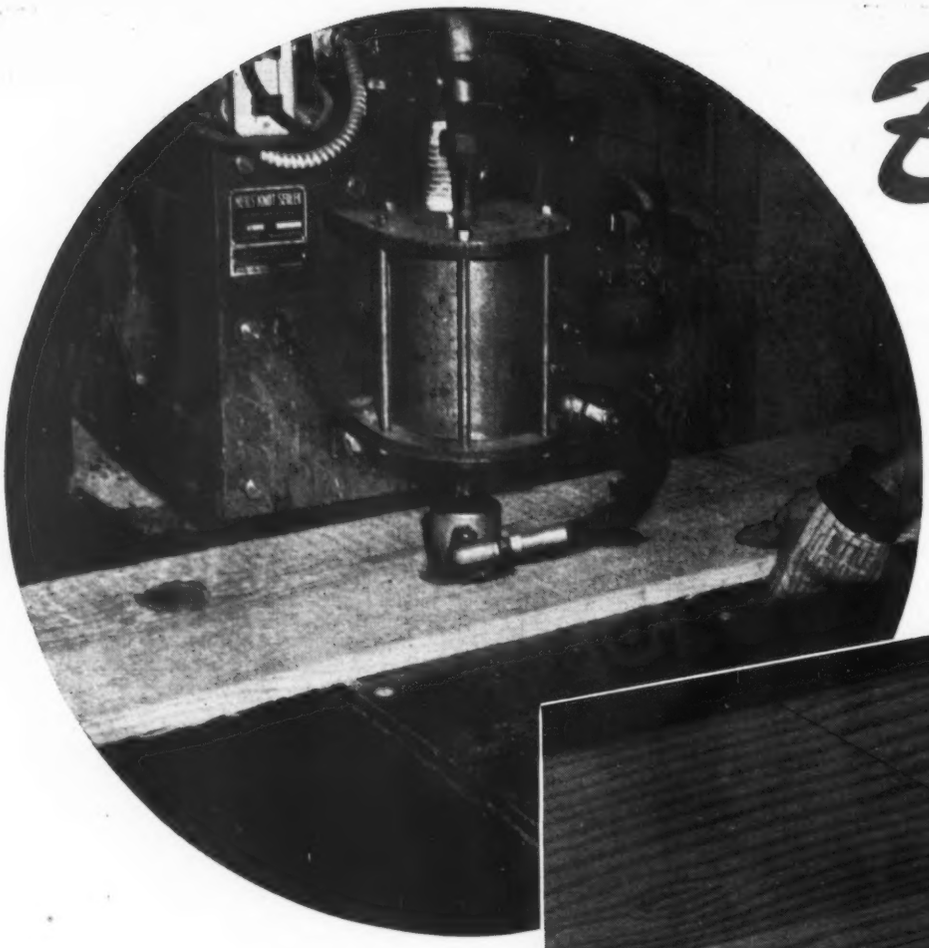
Since most of the substitute materials have qualities which make them difficult to handle or to work as compared with wood, the usual means for overcoming the handicap is to go to the laboratory for the answer. To get even a toe hold the chief competitors for wood markets were forced to build up efficient research organizations. But the lumber industry's markets, like the forests, were so vast that the industry did not feel that it could afford an adequate research program. God grew the forests for

(*Continued on page 64*)

Better

By NELSON C. BROWN

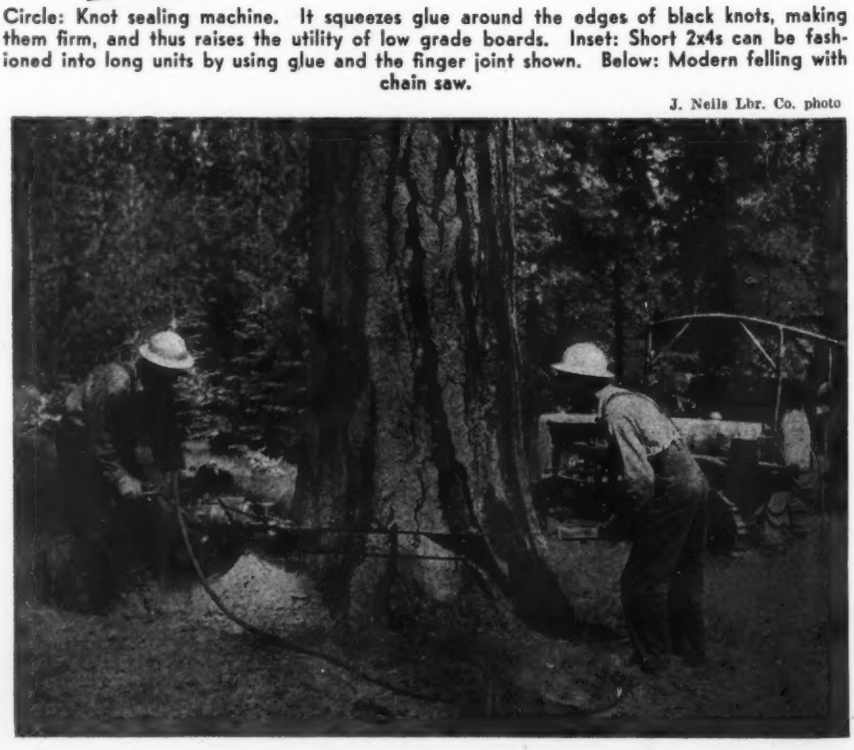
New York State College of Forestry at Syracuse



Weyerhaeuser photo

Circle: Knot sealing machine. It squeezes glue around the edges of black knots, making them firm, and thus raises the utility of low grade boards. Inset: Short 2x4s can be fashioned into long units by using glue and the finger joint shown. Below: Modern felling with chain saw.

J. Neils Lbr. Co. photo



MANY PROGRESSIVE lumbermen are giving considerable thought to—"What's ahead in business?" What will be the postwar demand for lumber? How can the product be improved? What fancies and foibles will be in the public mind for new types of dwellings? What about the industrial outlook and the demands for lumber for new construction?

The American lumber industry has not always been alert to its best opportunities in manufacturing, fabrication, sales and general promotion work, as well as in studying and meeting consumer needs. There is every reason to believe that many of the comparable and larger American industries such as steel, aluminum, chemical and automobile groups have not been entirely "asleep" or unaware of their opportunities for expansion and the competition for new business, whatever it may be, when the guns stop firing.

The war has given a new significance and meaning to the importance of wood in many forms, as well as lumber. There is reason to believe that wood in its various forms and uses may be the most important raw material of the future. There is plenty of it now standing and available in our forests and it is being rapidly regrown, especially on the properties owned by some of our largest and most progressive lumber companies through tree farms and many phases of better forest management. This

Lumber Produced by Improved Methods

country has the basic manufacturing facilities for an enormous quantitative production, but have we given sufficient attention to qualitative production? Labor, the great and present bottleneck of production, probably will be available. We have the plant facilities and the timber and the only question remaining is: How will the American lumber industry meet the inevitable competition with other materials?

Will it capitalize on the enormous public prominence given lumber and its importance in winning the war? This is a challenge, as well as an opportunity. The postwar period will be the real turning point in the history of the American lumber industry.

In examining the changes that have been quietly and perhaps sporadically taking place within the industry, there are several "high spots" that show definite trends and improvements in conversion of our raw material—standing forests and saw logs—into some useful product.

These improvements may be technological in saving materials otherwise wasted, they may be new mechanical devices to save unnecessary and expensive employment of labor, or they may be advances in the desirability and adaptability of the final end product. Among these developments may be enumerated the following:

Improvements Through Research

The American lumber industry, through its various associations and individual companies, has recently spent increasingly large amounts of money on wood research. These programs have developed a good many interesting and new things, particularly such features as faster seasoning through increased volume of lumber sent through the dry-kilns. This may alleviate somewhat the problems as far as furniture wood is concerned. There is a generally increasing program to put through the kilns all of the products of the sawmills except the lowest common grades and timbers. Even softwood dimension sizes and plank are now being kiln-dried that were never dried in this way heretofore. Other important developments include the removal of pitch from several of the pines which will eliminate finishing problems. Then there are various systems for impregnation with preservatives or other special chemicals during and after manufacture to increase the life of the lumber and timbers in service, to increase fire resistance, to harden the wood material itself and therefore make it useful where resistance to wear and impact are important. Many of these improvements in wood and improved wood by-products are described elsewhere in this issue.

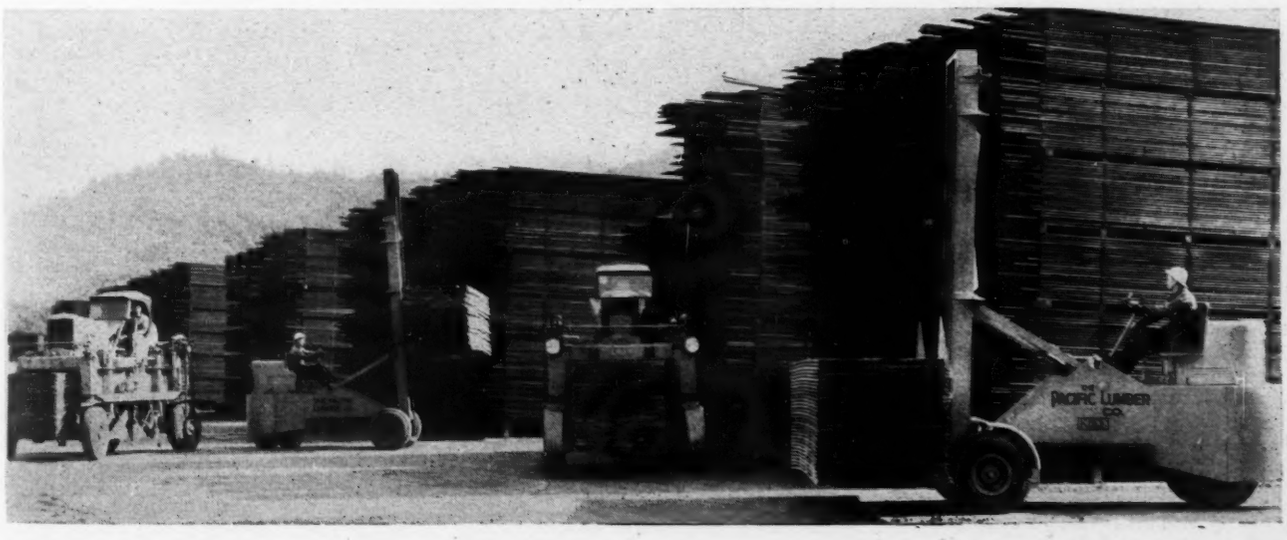
Improvements in Logging

For many years the industry has used chain saws, or drag saws, operated pneumatically, or powered by a gasoline motor or even by electricity, in both falling and bucking operations. It is only within the last few years, however, that chain-saw manufacturers have made an efficient, satisfactory and workable chain saw used for undercutting, falling and bucking timber of all sizes, shapes and forms that may be used in nearly every section of the country. For several years past, the Green Lumber Co. (formerly Eastman Gardiner Co.), Laurel, Miss., used a very satisfactory chain saw driven by a gasoline motor and operated by two men in falling and bucking long-leaf yellow pine. That type has been improved and is being used with many technical improvements in several sections of hardwoods and the large timber stands of the West Coast. One of these saws will replace the labor of five to ten men performing similar operations.

High powered diesel tractors and trucks and trailers have all but replaced expensive flumes and chutes and private logging railroads in most sections of the Rocky mountains, Lake States, Canada, and the West Coast. Heavy duty trucks replaced logging railroads on the Menominee Indian Reservation at Neopit, Wis., at least ten years ago and cut a reported $1 a thousand from logging and handling costs. Such companies as W. T. Smith Lumber Co. and Dierks Lumber & Coal Co. operate as many as 100 trucks each in their lumbering operations.

For many years, loggers in Europe have been cutting down long, or tree-length logs and hauling them by truck to the sawmills. These are not entirely small logs as one ordinarily associates with European timber. The writer has seen many Norway spruce logs in Europe 60 to 80 feet long and even longer, hauled from stands running 80,000 board feet and more per acre, to the sawmills where electrically driven chain saws were used to buck the long lengths in the log storage yards into the desired log lengths. In American logging practice, the tendency has recently been to bring in more and more long lengths by truck and then use a power cut-off saw to reduce the lengths to the desired

Carrier and lift trucks which speed lumber handling by moving it as unit packages. Ross Carrier photo



sizes. Still more recently, many improvements have been made to skid long lengths by tractor or power logging to the landings and then to use power crosscut saws to reduce the tree lengths to the desired shorter lengths. Then the latter are loaded on railroad cars, or trucks, and hauled to the sawmills.

The J. Neils Lumber Co. of Klickitat, Wash., and Libby, Mont., has installed an ingenious device to buck up long or tree lengths of Ponderosa pine that have been brought to the landing at the railroad loading point by tractors. They are then hauled up bucking chutes by cables and electric motors. An electrically-operated bucking saw cuts these long-length logs to shorter lengths by stopping the logs in the chute at the desired spot. After bucking, the logs are kicked off by electric kickers, similar to the log kickers used to remove logs from the jack-ladder onto the log deck in the sawmills. They then roll down to the tracks where a log loader picks them up and places them on log cars for delivery to the sawmill. With this method it is estimated that five men are able to do the same job which formerly required nine men and two tractors.

Trees are being felled in the woods with lower stumps. The day of the springboard passed on many years ago in northern Idaho and it is passing out of use in many sections of the West Coast. Tops also are being taken to small diameters because they are now marketable in some places as pulpwood, also for chipping into material for fibre-boards, floor coverings, insulating materials and other fibrous wood products.

Manufacturing Improvements

The day of producing lumber as such and assuming that there will be a ready market for it has gone forever. Of course, the big demand for lumber may always be for certain types of boards, dimension and structural timbers, but there is an increasing demand to further refine the product and make materials that are useful for specialty products. In many parts of the country, hardwood sawmills have been able to secure a much better price for their raw product by making special sizes and specifications to meet the demands, not only for furniture, but also for agricultural implements, tools, gun stocks, wood heels and a thousand and one products that formerly were made first into lumber in sawmills then sent to a refabricating plant where the lumber was converted into dimension stock, or blanks for some special products, and then reshipped to the final plant making the end product. Many of these special sizes and forms can be made just as well at the sawmill as in a refabrication plant. Many sawmills, in both the hardwood and softwood branches of the industry, have installed manufacturing plants to take care of special customer requirements. Many of the largest general businesses of the country, such as Eastman Kodak, International Harvester, Singer Sewing Machine, General Electric, U. S. Steel, the chemical industries, railroads and many other buyers use enormous quantities of lumber. Some of them require small sizes and shapes and conditions that may just as well be made at the sawmills as in some intermediary manufacturing plant, thus saving a double freight rate, as well as the weight of the primary product which contains knots and other defects which could better be eliminated at the source of supply rather than at the fabrication or finishing plant.

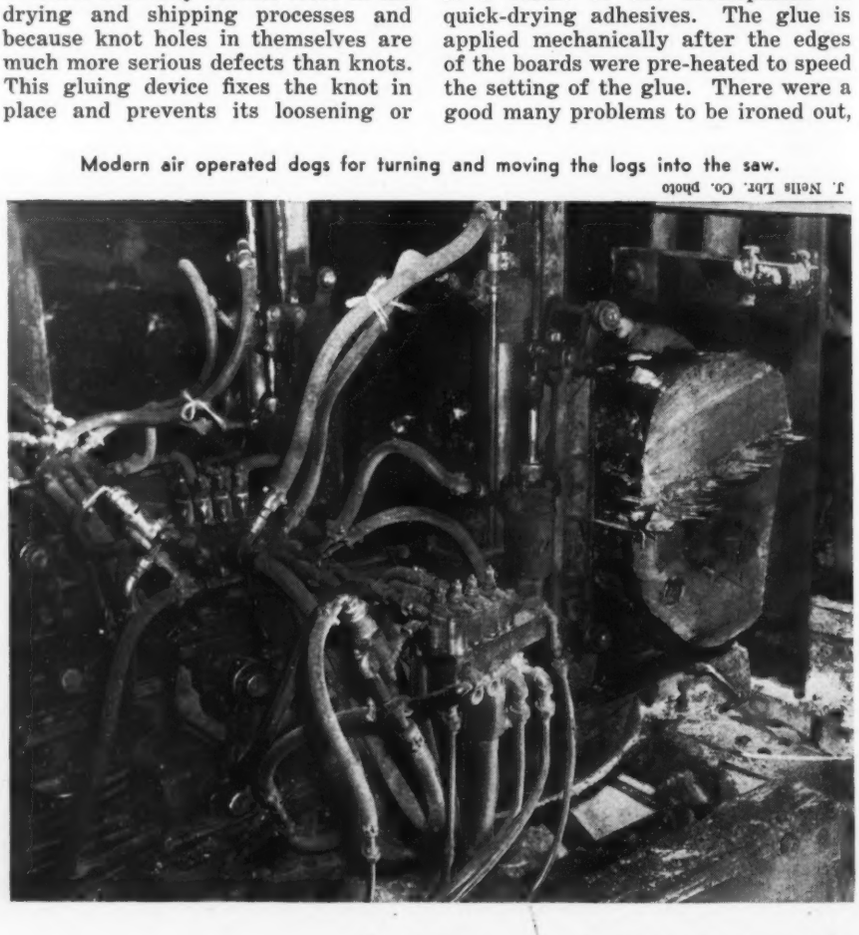
Lumber also is being more and more accurately manufactured, particularly as to thickness, width and length, both in the rough and finished sizes. There has been a great improvement in the accuracy of double-end trimmers which insures not only square ends on boards, but also exact lengths.

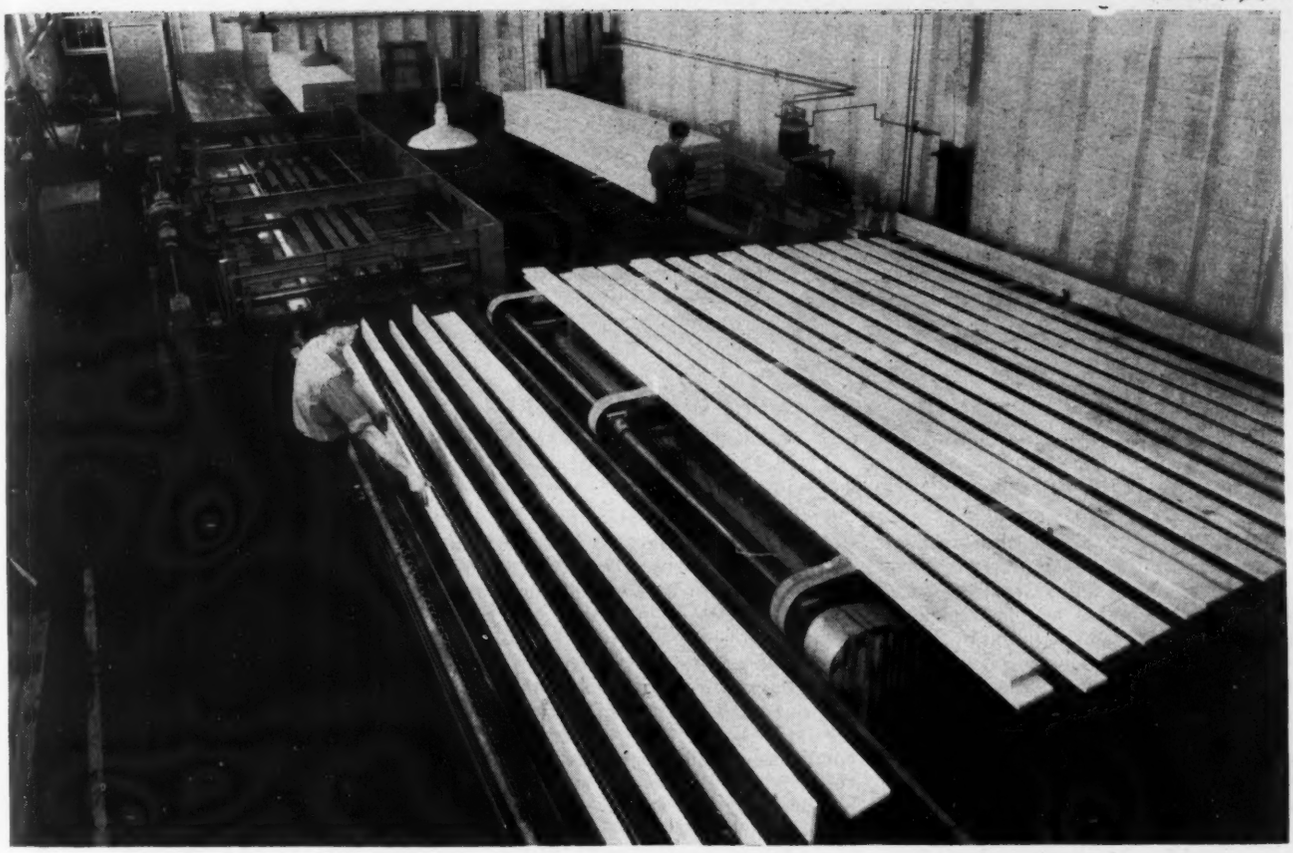
Some of the more progressive manufacturers produce packaged lumber; that is, ceiling, partition, siding and finished boards that are put up in neat paper-wrapped packages to insure cleanliness and arrival at destination in good and attractive condition. It is noted that the lengths, thicknesses and widths of these packaged boards are uniform and accurately dressed.

Among the more recent developments are devices to inject glue into knots to tighten them. Much lumber is de-graded because of loose knots, or knots that may become loose in the drying and shipping processes and because knot holes in themselves are much more serious defects than knots. This gluing device fixes the knot in place and prevents its loosening or falling out during handling. Some companies have also developed machines to cut out knot holes and replace them with a fitted patch. Clear lumber may be worth from twenty to sixty dollars or more per thousand board feet than boards with a large number of knots. With the development of improved wood adhesives, particularly moisture resistant and heat resistant glues, this development gives promise of many better things for the future. Lumber buyers do want and demand good, clean looking boards—and especially women who will be the actual purchasers more and more in the future.

During a period of about two years, more than three million board feet of wide one-inch finished boards ranging in width from 12 inches to 29 inches have been produced by one of the largest Idaho white pine mills by gluing together several narrow boards along the edges to make wide ones. This method of edge gluing boards to make "wide ones out of narrow ones" was devised by an engineer named Bowling, the same man who produced Pres-to-logs from waste shavings. Now a glued up panel is turned out every two minutes with maximum dimensions up to 1x48 inches wide by 20 feet long. Under ordinary hand methods it used to require up to twelve hours for the glue to set so that the boards could be released from the pressure of the clamps which held them together. Now this time has been cut down to two minutes. This is a result of the development of quick-drying adhesives. The glue is applied mechanically after the edges of the boards were pre-heated to speed the setting of the glue. There were a good many problems to be ironed out,

Modern air operated dogs for turning and moving the logs into the saw.
J. Neils Lbr. Co. photo





Above: Equipment for making wide boards from narrow ones by gluing. Upper center is seen a load of narrow boards matched for making wide panels. They first pass one by one, on edge, through the glue spreader at upper center, then to the conveyor, to move to the operator at lower left who is heating the dry edges before the boards are put on the clamping machine at left center. The finished panels emerge at upper left where a stack of them can be seen.

Weyerhaeuser photos

Above inset: Grader laying up boards into panel units to be made into wide boards. He draws the curved line to identify the units, and the boards will be glued up in this order. Right: Glued-up boards emerging from the clamping machine. Note the fit of the curved line made by the grader.

but this may revolutionize the method of making wide boards or those to fit certain market requirements and overcome the problem of the many strips and narrow boards turned out in our sawmills. The accompanying illustrations show how this is done.

One of the largest sawmills in the country at Longview, Wash., is making end locked or matched 2x4 dimension known and copyrighted as "Nu Loc." This resulted from a demand for more eight foot studs than were normally produced from the logs; also the fact that due to end trimming there was a good deal of loss of good lumber. The same synthetic resin glues used by aircraft and boat builders was used to weld together short lengths of 2x4s into long lengths which could be cut off to the desired eight feet lengths or any other lengths desired. The glue joint is stronger than the wood itself and this has meant a great saving of wood otherwise wasted in the sawmill and gives promise of wide adoption. The same method, of course, could be applied to other sizes than 2x4, but up-to-date it has only been used commercially with that size. A special machine was designed to make a finger joint.

End matching of flooring, sheathing and even of siding has been used for some years. Some of the machines performing this work have not been entirely efficient, but they are steadily being improved. End matching has resulted in saving much good lumber formerly wasted because softwood board could only be sold in even foot lengths.

Some companies also are easing the edges on boards—that is, running the boards through a machine that slightly bevels the sharp edges and thus makes them easier to handle and less likely to leave splinters in the hands of those handling the product.

New methods of improving the kiln drying processes of hardwoods have helped to increase utilization of the products of this important branch of the lumber industry. Many new uses also have been found for hardwood. Years ago the automobile industry alone used more than one billion board feet of hardwoods, yearly. Then due to changes in design this market was largely lost. However, it has been demonstrated that hardwood truck

(*Continued on Page* 58)

IMPROVING *Dimensional Stability*

THE YEAR 1935 saw the start of work on the development of improved woods and plastics; but the number of technical men assigned to these problems was small and progress was slow. Tremendous acceleration of this effort accompanied the advent of the war period. Though many of the improvements are now being applied to the science of war-making, they have equal usefulness in a peacetime economy.

Dimensional stability in wood was a prime goal for the experimenters. The answer was sought through several methods and with the use of several materials. Resin impregnation was one of the earliest. European laboratories had done some work along this line, but their methods did not succeed in achieving an appreciable degree of dimensional stability.

U. S. Forest Products Laboratory, Madison, Wis., found that putting inert large molecules into the wood structure merely coated the inside of the structure but failed to change its equilibrium. Whatever chemical was to be used had to be put into the very structure of the cell wall. The fact led to the use of the phenol-formaldehyde combination—because it is chemically active; because it is composed of small molecules; and because wood has a greater affinity for those chemicals than for almost any other. Treated with those materials wood will soak up more of them, and swell more with them than it does with water.

Thus the phenolic resins, the urea resins to a lesser degree, and the resorcinal resins are among the most prominent stabilizing chemicals. Most of what are called the thermo-plastic resin-forming systems are inadequate for stabilizing wood because they are not sufficiently chemically active to bond to the wood. They are merely mechanically deposited on the wood and that is not good enough. Chemical must go into every fiber or those particular fibers missed will swell and destroy the whole effect.

In general it is not practical to attempt to treat massive pieces of wood with resin-forming chemicals. It goes into the sapwood but it is difficult to get uniform distribution in the heartwood. Thus Forest Products Laboratory's attention was focused on treating of veneer. Three methods were tried: simple soaking of green veneer in solution (too slow); cylinder treatment using pressure or a combination of pressure and vacuum (most widely used); running the veneer through compression rolls whose nip is beneath the surface of a pool of solution, thus compressing the veneer and allowing it to expand when submerged to soak up solution (very fast). Softwoods and soft hardwoods treat very nicely under this latter method and do so as quickly as the veneer can be run through the rolls.

Next step is to dry the wood to remove the water, and then immediately cure it to get impreg (resin-treated uncompressed wood). The resin-forming chemicals plasticize the wood so that it will compress very readily in comparison to what it would compress if the resins were pre-cured.

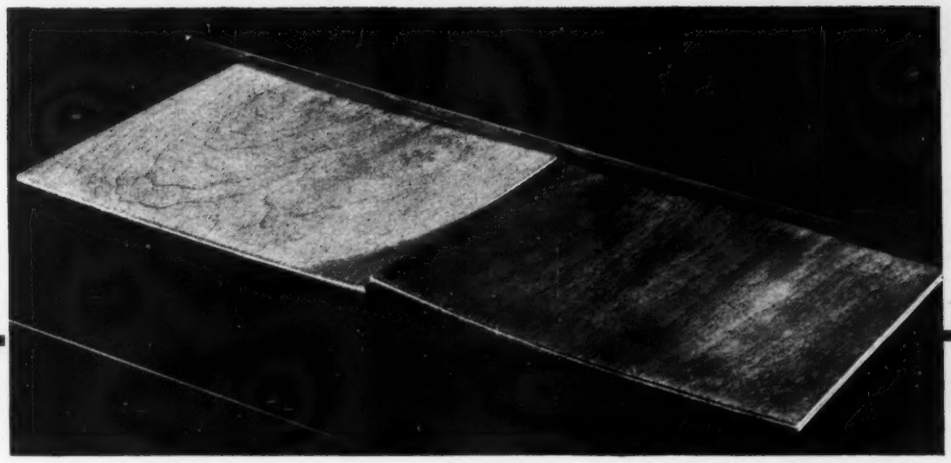
But basically the purpose of the treatments is to stabilize, and with phenolic resin swelling and shrinking can be reduced by 75 percent. This of course reduces checking and warping, and in addition electrical resistance properties are improved considerably. The urea chemicals are only about 25 percent efficient in achieving dimensional stability. None of the resin treatments provide a fire retardant action if the wood is left in an uncompressed form. When compressed the fact that the structure is held together better discourages fire. However the treatment does provide fine decay and termite protection, and marine borer resistance.

Mechanically any of the resin treatments improve only one group of wood's properties—that is compressive strength and hardness. They have also one detrimental effect—they tend to make wood more brittle. The more resin that is introduced into wood, and the more evenly it is distributed through the piece, the greater the brittleness. When the material is used for facing plywood the brittleness is not a serious obstacle, nor is it in the case of many other uses.

Compreg is a similar material that

The front specimen at left is birch "compreg" and the rear one contains about 200 laminations. Below, two samples of maple before and after the "Staypak" process, which consists merely of compression at higher than normal humidity and temperature.

IN WOOD



Plywood treated and untreated (with Methylolurea) and its reaction to eight months of outdoor exposure.

THE LACK of dimensional stability is ranked as natural wood's number one shortcoming. It is the quality which causes drawers and windows to stick, furniture to loosen and floors to buckle. With this problem licked the lumber industry can offer a product whose standards of performance can be guaranteed, which can be used in machinery where accurate dimensions are required, and whose superiority over other materials, in its traditional uses, is unquestioned. This article traces the progress made so far by wood scientists towards achieving dimensional stability in wood. Some of the data is from a paper by A. J. Stamm, of Forest Products Laboratory.

is compressed prior to the setting of the resin.

The method of introducing the resin-forming chemicals and treating the wood are as important as the chemicals themselves in achieving dimensional stability. In fact resin treating itself does not assure stability. Samples of resin-treated compressed wood made in Europe which were soaked in water for a period showed a dimension change far greater than untreated wood will swell. This was because the resin was introduced mechanically and did not penetrate the cell wall structure. Thus when the specimen was soaked in water, both swelling and springback of the original compression were results; and two-thirds of the dimension change was spring-back.

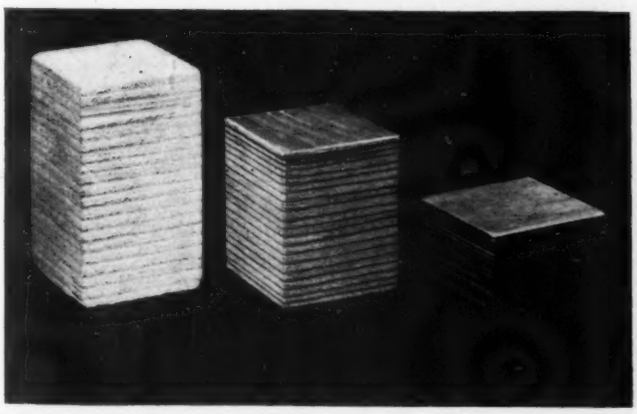
Also of interest are the strength properties of compregnated wood. In reality the strength of the wood is not at all increased, but in compressing it, three fibres are put into the space formerly occupied by one and each has retained its original strength —therefore the strength has been concentrated rather than increased. Thus the nature of a construction problem will determine the choice between the use of ordinary wood and compregnated wood as the raw material. Disregarding cost it all simmers down to space limitations. If a certain degree of strength is required of a member which must fit into a proportionally small space—compreg is the logical choice. But if space is no factor, such as in the building of truck bodies the use of ordinary lumber in a larger size is unquestioned.

Airplane propellers provide a splendid example. The problem is to trim size to a minimum and retain or increase strength. A decrease in the diameter of the hub of one inch decreases the weight of the necessary fittings by 150 pounds. Here then is a real reason for use of compregnated wood and its concentrated strength factors. The blade can be thinner—the hub smaller.

Compreg is a fine material in all respects except impact strength—this factor is less than that of the original wood.

Because resin embrittles wood a method of compression using no such compound was tried. When ordinary wood is compressed under ordinary conditions, later soaking in water not only causes natural swelling of the wood, but also springback of the compression. The latter has been overcome, however, by applying the compression power at higher than ordinary moisture content, and higher temperatures, which makes the lignin in the wood flow. The result is that the stresses in the wood fiber which are ordinarily developed by compression are absent when the lignin flows, and the tendency to springback is minimized. This material has been called "Staypak" by the Forest Products Laboratory. It is twice as tough as a similar compregnated wood—it is tougher than the original wood. Tensile strength is increased 25 percent and all strength properties are superior to compreg. However, in time, the material will swell and shrink. A large board though, soaked in water for a year scarcely showed any swelling. Surface fibres of this material respond to humidity changes readily and must be painted if used outdoors.

The scientists' ideal, however, is to make an uncompressed wood that is stable and yet retains all of its original strength properties. The problem has been solved by introducing a stabilizing agent which is so new that no information about the process has as yet been released. The final product has afforded anti-shrink efficiency as high as 82 percent, and has proved to be tougher than the original wood from which it was made. It can be made in either uncompressed form, or the equivalent of compreg.



The sample at left is 20 plies of untreated 1/8-inch spruce, assembled at 150 pounds per square inch. The center sample is 20 similar plies treated with resin and compressed under 250 pounds. At right is resin treated plies subjected to 1000 pounds.

Glued-laminated arches for a cafeteria building made up of 5/8 inch kiln dried lumber with 27 laminae at the elbow and graduating to 13 laminae at the top and to 19 at the base.

MODERN GLUES FOR WOOD LAMINATION

LAMINATED WOOD and plywood are destined to play an important role in the future. Their durability and usefulness have been greatly improved in recent years, and there will be an increasing number of applications for them in building and manufacturing. A good deal of the credit for this success must be given to the modern glues.

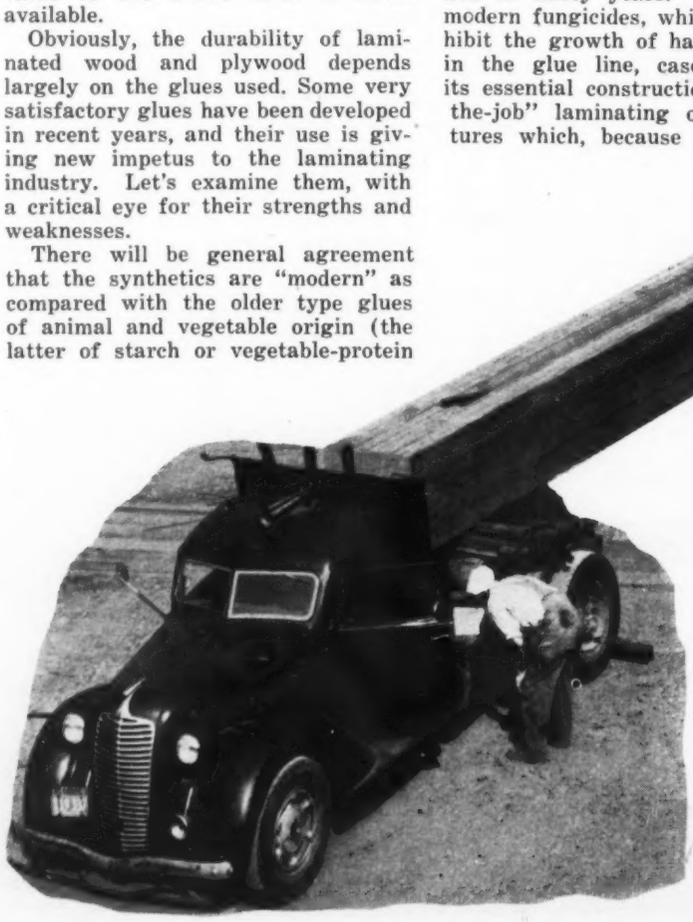
The value of plywood as a construction material can be readily demonstrated by means of a simple test. If you will take a piece of thin single-ply veneer in your hands you can see that it is strong in one direction—but so weak in the other direction that it can be broken easily with the fingers. Strength in both directions is achieved by crossing the plies and bonding them with a strong adhesive, resulting in a balanced construction made strong by the use of glue.

As opposed to plywood, the term "lamination" generally refers to the taking of solid wood (and one thinks of ½-inch and up as "solid") and gluing it with all plies running in the same direction. Because no two pieces of wood have the same grain, there is an inevitable slight crossing of the grain which makes the laminated construction stronger than solid wood of the same dimension and very much less subject to splitting and checking. If, due to some unrelieved stress or moisture condition, a split starts in one ply, it will not be transmitted to the next.

The use of fast growing woods like southern pine in large built-up beams illustrates the effectiveness of lamination. One would hesitate to use some of the lower grades for stressed construction, yet, laminated, the possible weakness of one ply is not transmitted to the next, and the total value of the entire mass is made available.

Obviously, the durability of laminated wood and plywood depends largely on the glues used. Some very satisfactory glues have been developed in recent years, and their use is giving new impetus to the laminating industry. Let's examine them, with a critical eye for their strengths and weaknesses.

There will be general agreement that the synthetics are "modern" as compared with the older type glues of animal and vegetable origin (the latter of starch or vegetable-protein base, the former from the animal kingdom—fish, hides and hoofs, blood albumen) and casein. This last, casein, might be called of "near-modern" type, its period of general commercial use being from twenty-five to thirty years. Fortified with modern fungicides, which at least inhibit the growth of harmful bacteria in the glue line, casein glue finds its essential construction use in "on-the-job" laminating of large structures which, because of convenience



Data in this article were taken from a paper by W. F. Leicester, president, Casein Company of America.

Photos: Courtesy Timber Structures, Inc.

Above: This chapel for an army airfield in Oregon is being built with large laminated timbers. Left: This huge dredger spud is 30 inches square and 85 feet long. It was constructed from many smaller pieces of lumber glued and laminated. Modern synthetic glues and improved techniques make laminated woods adaptable to a wide variety of uses.

Fuller utilization of our forest products has been made possible by the development of new synthetic adhesives.

or size, are not constructed indoors and in gluing panels to studs in building structures. The fact that casein glue will set and bond wood at temperatures down to the freezing point gives it a facility of use not possessed by the newer synthetic resin adhesives.

Synthetic resins have come into use as glues for wood during the past ten years. First, there was the phenolic resin in film form, first imported from Germany, later manufactured in the United States.

Urea Resins

This was followed in 1937 by the first U. S. manufactured urea-formaldehyde resin which, with appropriate catalyst, sets and bonds wood at temperatures from 70 up to 300 degrees F. — the higher the temperature, the shorter the time. Since their introduction, urea resins have been improved. Basically lacking in heat resistance, special formulas have been developed which fortify these resins against heat, making them boilproof. And the crazing or cracking tendency of urea resins in thick sections such as are sometimes found in poorly fitting joints has been arrested (although not permanently) by a so-called "craze-proofing" treatment, an addition to the resin which at least delays its crystallizing tendency. But good as urea resins are—and their good performance has been proved by large-scale use for war constructions and in the manufacture of furniture—their all-around long-term durability has been somewhat disappointing. Generally speaking, the joints do not improve with age, and they are not completely durable under outdoor exposure. They do not withstand high temperatures, and their rate of deterioration under exposure to high humidity and high temperatures (in the neighborhood of 160 degrees F.) is rapid. While it has been the trade custom to refer to urea-resin adhesives as "waterproof," it is now thought that they are not entirely so. But let it not be thought that urea-resin glues are outdated. Their low cost and easy handling (particularly their ability to set at room temperatures) will insure large-scale use in the manufacture of furniture, laminations and plywood which are not destined for continuous outdoor exposure.

Melamine Resins

Melamine resins spring from the same chemical family as urea-resins, but are set at elevated temperatures only. They have the advantage over urea resins of being boilproof and high in durability.

Phenol Resins

Phenol resins are not in as large-scale use as phenol-formaldehyde resins which, in film form for very thin aircraft plywood and similar constructions and in liquid form for commercial plywood, are coming into large quantity use. The present largest use of phenol resin is in the manufacture of fir plywood on the Pacific coast. In that section, competition plus improved formulas have brought the thousand-foot glue line cost of 3-ply construction down to between $5 and $6—not much more than double that of the non-waterproof oilseedmeal glue and definitely below that of casein glue. This refers to

(*Continued on page 86*)

Photos: M & M Wood Working Co.

A bundle of plywood is removed from the high frequency pressing equipment at the M & M Wood Working Co.'s plant at Albany, Ore. The copper electrode at the center of bundle distributes high frequency energy evenly through the plywood, thereby setting the waterproof bond.

HIGH FREQUENCY HEAT OPENS NEW MARKETS

DURING THE past year or so you have probably read about high frequency heating. Perhaps you have heard it called induced heat or radio frequency power. The exact name doesn't matter so much, because all of these terms apply to the same process. The important thing is that you will continue to hear more about the technique, for it is one laboratory development that has already found industrial applications—some of which might affect the lumber industry to a marked degree.

High frequency dielectric heating equipment has been used to dry tobacco in hogsheads and to kill infestation in grain. Experimentally it is being used to dry green lumber. And it has already proved successful in expanding the production of laminated and box spars, rib constructions, bomb bay doors and other airplane parts. High frequency is proving its efficiency in curing impregnating resins and heat-setting adhesives.

These applications are sufficiently important to cause considerable speculation. What is high frequency heating? How and why does it work? What will it mean to the lumber and wood products industry? What type of equipment is employed? These and a host of other questions are being asked by forward-looking industrialists. To date only the technical men have had the answers, but there is a growing need for popularization of this scientific knowledge.

Actually there is nothing magical or mystical about high frequency heating of wood—it works in much the same way as an electric toaster or waffle iron, despite the fact that those units are operated by low frequency current.

Most materials generate heat when an electric current of ample strength is forced through them. The heat is caused by molecular friction. Roughly speaking, an electric current may be regarded as the flow of electrons through a substance. Normally the electrons in that substance would have random orbits, but when a voltage is applied the electrons not securely bound tend to move from one side of the substance to the other. This movement of electrons is opposed by friction which generates heat. Scientists do not believe that the electrons flow clear across the material. The particles move only for short distances but mostly in the same general direction. The total effect of this movement constitutes an electric current.

That is oversimplification but it will suffice to illustrate a point.

Now all materials may be roughly divided into two groups: Conductors and non-conductors (or insulators.) Metals are good conductors; woods are not. The difference between good conductors and non-conductors may be simply described as the relative degree of freedom of electrons in the material. In a conductor the electrons are less tightly bound, move more easily under the pressure of voltage.

For example, the heating element of a toaster is a piece of metal wire. A comparatively low voltage is sufficient to pass current through this wire, cause friction and generate heat. Low frequency currents are used to operate units of this type.

The term "non-conductor" is misleading and "poor

Much of the technical information in this article was taken from a paper by C. C. Brumleve, assistant to the vice-president, Thermex Division, Girdler Corp., Louisville, Ky.

Split-proof panels of four-inch plywood are used as gusset plates in making roof trusses and to build pillars for support of roof trusses.

conductor" should be used instead. Wood, for example, will carry an electric current in the same way as a piece of wire, but it takes greater voltage and much higher frequencies to force the current through the wood. The so-called radio frequencies are high enough to force current through wood and generate heat.

Heat so developed is called "induced" heat. Since it is generated by friction of minute particles all through the treated substance, it is more or less evenly distributed within the substance. By means of high frequency dielectric equipment, heat can be induced in thick sections as readily as in thin sections of a material such as wood. The heat can be built up rapidly, and the center of the section heats as fast as the surface. Obviously, this method has at least a theoretical advantage over the practice of pressing the wood under hot platens which heat the surface and depend upon conduction for the heat to reach the center.

High frequency heating of wood is fundamentally simple. All that is actually necessary is a suitable generator connected to the wood with proper wires or electrodes. In actual practice, however, many applicational problems arise, and the equipment must be designed to overcome those problems. The dielectric machine must be able to handle sections of the desired size and shape, and the electrodes should consist of metal plates large enough to induce an even flow of current through the entire piece of wood under treatment.

A trained man can easily compute the voltage required to achieve a desired heating effect on wood of known dimensions, and high frequency generators used commercially can be "tuned" or set according to the particular job on which they are operating.

The foregoing explanation has been greatly simplified and many technical details have been omitted, but it gives a clear picture of the fundamental principles involved.

The high frequency method of inducing heat is relatively new insofar as its application to wood products is concerned, and a complete analysis of its ultimate uses and costs would be premature at this time. We can, however, look at the record to see what high frequency has accomplished in the laboratory and in industrial plants, and this will give us a line on future developments.

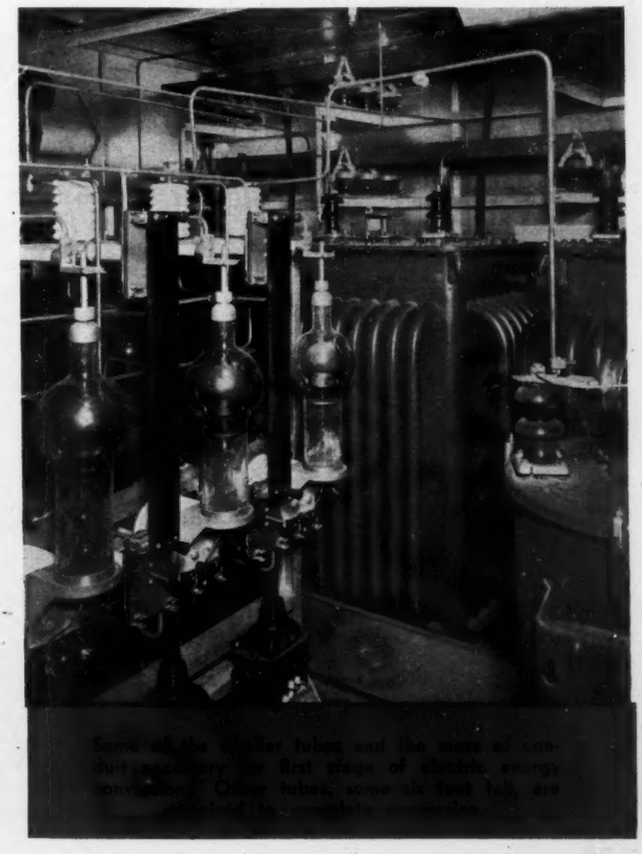
The M & M Wood Working Co., Portland, Ore., operates a plywood plant at Albany, Ore. Dielectric equipment in that factory is used to bond the adhesive and laminate the plywood sections. Photographs on these pages show the various installations and explain the technique.

The Thermex Division of the Girdler Corp., Louisville, Ky., was one of the first to manufacture industrial high frequency heating equipment. Preliminary research—plus experience gained in actual manufacturing operations—has given that firm considerable data. The following paragraphs summarize this available knowledge.

Lumber drying received early attention during the experiments. Typical examples are thick pieces of maple and walnut. A walnut piece approximately two inches thick and 15 inches long was dried from 30 percent moisture to less than five percent moisture in three hours. A piece of solid maple two inches thick and 25

(*Continued on Page* 79)

Panel board which controls the high frequency equipment. Because of varying dielectric factors, each plywood bundle must be "tuned in" to obtain maximum efficiency.



Some of the smaller tubes and the mass of conduit necessary for first steps of electric energy conversion. Other tubes, some six feet tall, are [illegible] complete connection.

Fire-TESTING TREATED LUMBER

FIRE PROOFING treatments for lumber are not new. For centuries man has experimented with the problem of making wood flame resistant. In recent years, however, approaches to the problem have been divided into two general methods; namely, surface treatment, and pressure impregnation. In both methods liquid chemicals and solutions are employed for their ability to retard combustion.

Surface protection can be achieved by dipping the lumber or brushing it with the proper solutions. This method is generally used on structures that have already been built, and where a degree of flame-spread protection is desired.

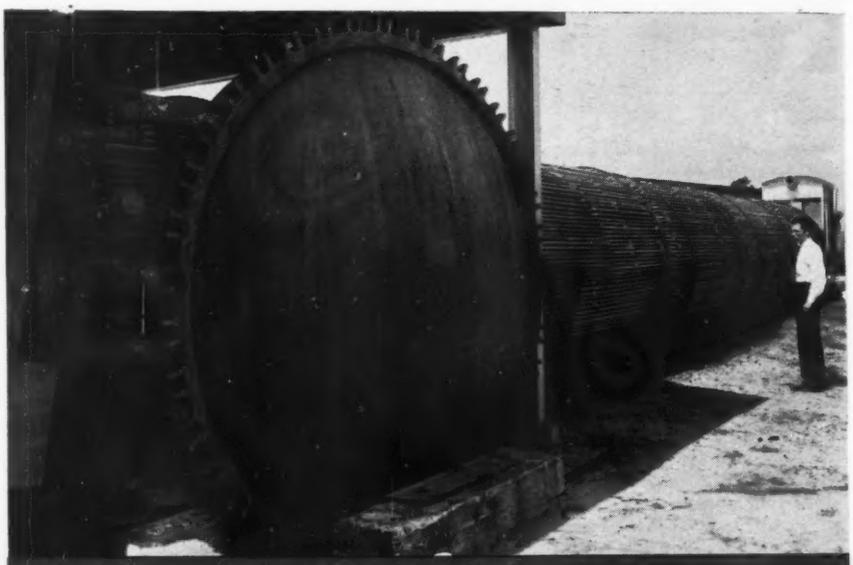
The other method of applying fire protection chemically is by pressure impregnation, which forces the fire retarding chemicals deeply into the wood fibers.

Although pressure fireproofing of lumber dates back to about 1910, the volume of this activity has increased enormously in recent years. Before the war about one million feet of lumber was pressure fireproofed each year. In the war year of 1942 between 60 and 70 million feet were given the same treatment. Army and Navy specifications have been the principal reason for the tremendous increase in volume. Pressure fireproofed lumber has been used in hangars, ordnance plants and many other types of war buildings.

Considerable research preceded development of the solutions commonly used in the commercial fireproofing of lumber. During the past few years there has been no fundamental change in those solutions, and the chemicals generally employed today are pretty much the same as those used before the war. (In passing, however, it should be noted that the relatively new "transmuted woods" exhibit a distinct ability to resist fire. These materials, made by impregnating wood with either phenolic resins or urea resins, are known as "impregs" and "compregs." Fresh out of the laboratory, they are not yet in large scale commercial production.)

The mere fact that the wood treating industry is using the same chemical solutions today as before the war does not indicate a lack of progress in this field. On the contrary, the industry has progressed rapidly in many ways. Under the pressure of expanding wartime volume much has been learned about handling and treating large quantities of lumber economically. In the last few years the cost of fireproofing treatment has been slashed in half. After the war the cost might be even lower.

Rapid strides have been made recently in the testing of fireproofed lumber under controlled laboratory conditions. There is a need for a rating method whereby the fire-resistant qualities of various building materials can be compared on a numerical basis, and the research men are striving to perfect such a method.



Pressure-impregnation method of fireproofing lumber. After the lumber has been placed inside, the huge cylinder will be sealed with the circular door and the treating solutions will be introduced under pressure.

Underwriters' Laboratories, Inc., has conducted a series of extensive tests to establish the "fire hazard classification" of such materials as untreated lumber, treated lumber, cellulose board, plywood, and fabrics. The substances were tested for the rate of spread of fire, the amount of fuel contributed to the fire, and the production of objectionable smoke while burning.

This fire hazard classification of building materials constitutes a new idea that differs from and supplements the established "fire retardant classifications" of fire doors, fire walls, fire windows, etc.

Space does not permit an adequate description of the elaborate equipment used at Underwriters'. The tests simulate actual building exposures that encourage rapid spread of fire, and have been made on common materials in their normal state as well as after fireproofing treatment. The results are compared on a numerical basis with the performance of untreated lumber that is classified as 100, and with noncombustible asbestos-cement board that is classified as 0.

In the past the burning characteristics of the various species and grades of wood have been assumed to be variable, but no index of the variations had been established until recently.

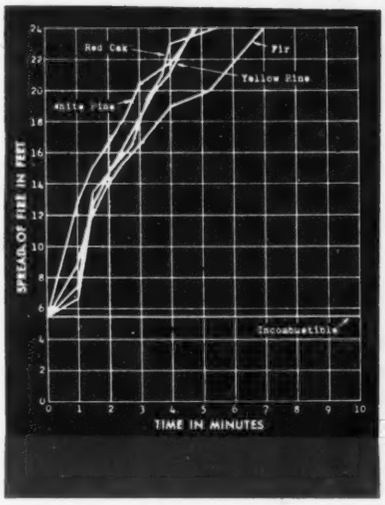
The charts on the opposite page show results of Underwriters' tests on untreated lumber, surface-protected lumber and pressure-impregnated lumber. There is a great variation in the performance of surface-treated woods, depending on the species as well as the adhesive and absorptive properties of the surface. Observations during investigation of impregnated lumber indicate that variations in the chemicals used and in the retention and distribution of chemicals produce varying results.

Only a few species of wood have been tested, and the tables serve only to generalize the fire hazard classifications for those materials which have been tested. The results are not definite classifications for any one species of wood or other material. Neither do the results serve as classifications for proprietary materials because of variations introduced by the manufacturers.

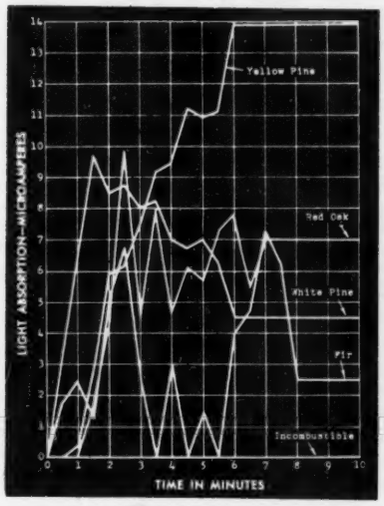
Nevertheless, these tables represent a great step in an important field of research. In a general way they indicate clearly the performance of flame-proofed lumber as compared to natural wood. They are not intended to point out weaknesses in untreated wood—but rather to show how fireproofing broadens the usefulness of lumber and adapts it to more types of construction than ever before.

Untreated Lumber

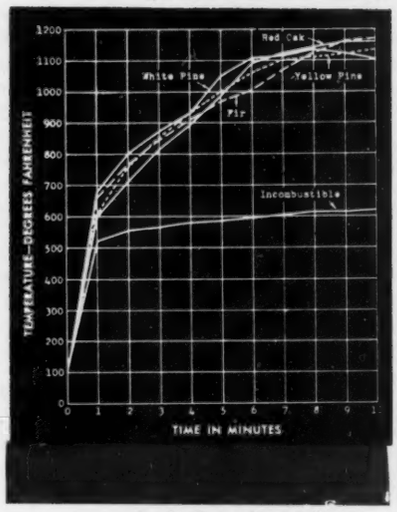
Illustrations: Underwriters' Laboratories, Inc.



Rate of Spread of Fire



Smoke Density



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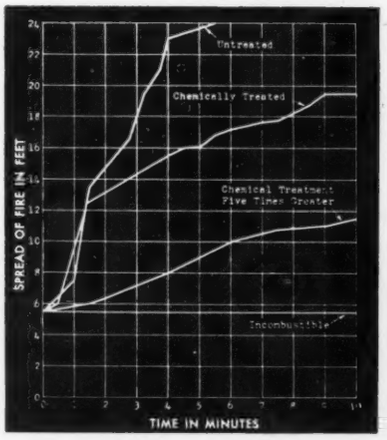
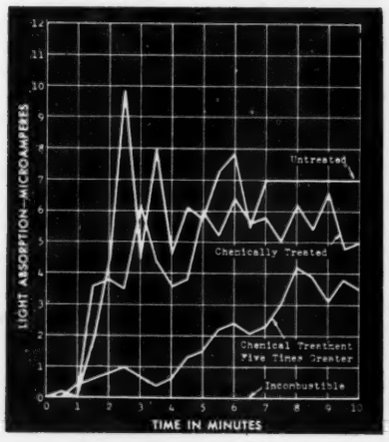
Pressure-Impregnated Lumber



Rate of Spread of Fire



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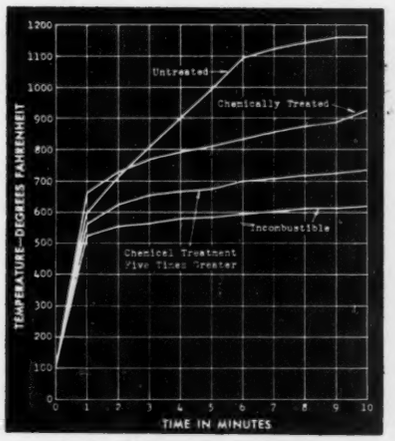

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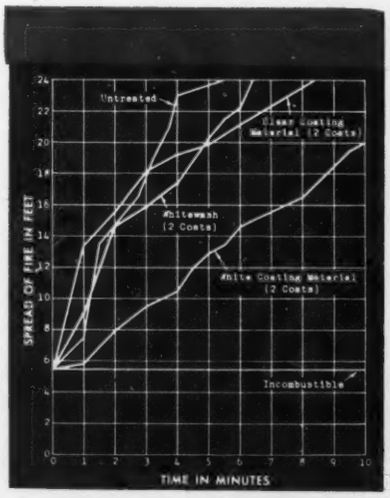
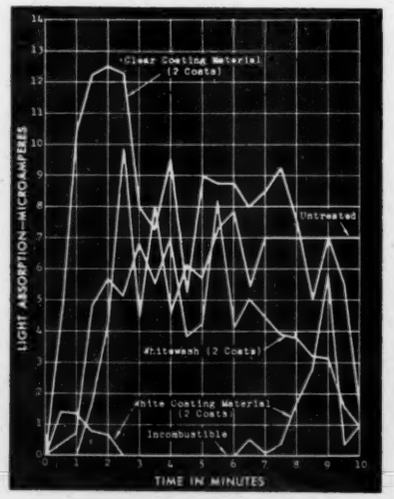
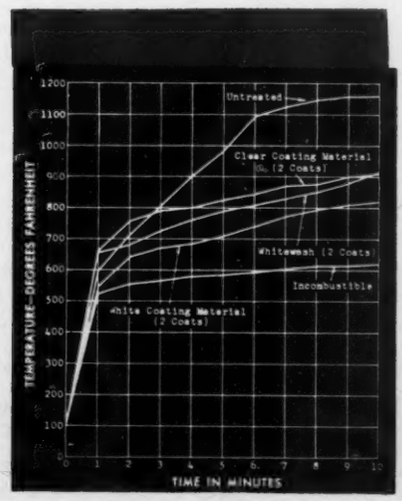
Surface Coated Lumber



Rate of Spread of Fire



Smoke Density



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Plastics

THE LATEST CELLULOSE &

THE STORY OF the commercial development of the first plastic material (cellulose nitrate) by the Hyatt brothers as the outgrowth of a prize offer of $10,000 for a substitute material for manufacturing billiard balls, is well known to the industry. The earliest applications of this same plastic were celluloid collars, dental plates, lacquers, automobile side curtains, photo films, etc. Modern plastics date from 1909 when the first true synthetic (Bakelite) appeared on the market.

The growth pattern of the industry makes an interesting curve. Production of all types of resins for all uses was as follows:

	Pounds
1920	20,000,000
1930	30,000,000
1940	300,000,000
1944	800,000,000

That is for all plastics. The pattern for cellulose derivitive plastics is approximately as follows:

	Pounds
1920	20,000,000
1930	15,000,000
1940	70,000,000
1943	140,000,000

Cellulose Plastics

Cellulose has found widespread use as a plastic base because it appears in such abundance in nature. A typical softwood consists roughly of 50 percent cellulose, 20 percent hemicellulose, and 30 percent lignin. Only cotton contains cellulose in a purer form.

Cellulose molecules contain glucose (in part), and each glucose unit has three chemically active hydroxyl groups. By chemical action these hydroxyl units can be replaced by other chemicals. Thus, if cellulose is nitrated by the chemist, what really happens is that nitrate groups replace the hydroxyl groups in each glucose unit, producing cellulose trinitrate.

The substitution of nitrate is only an example. Many organic acids and alkalis can be used this same way to vary the properties of the final product. Acids produce what is known as ester groups; alkalis produce ether groups. The possible combinations seem almost unlimited. Thus the technician can "tailor" cellulose to suit his fancy. Following are descriptions of the present state of development of cellulose plastics in both ester and ether groups.

Cellulose Esters

Cellulose Nitrate

Although cellulose nitrate is the oldest cellulose derivative plastic, research still continues in an attempt to improve upon its stability, that is, upon its ability to resist decomposition over long periods of time under various conditions. This decomposition results in the embrittlement of films, coatings and molded articles unless means are taken to retard or remove the cause. Recently another drawback of cellulose nitrate, its flammability, has been reduced by special plasticizers containing chlorine and phosphates. However, plastics containing these fire retardants are usually inferior in strength.

Outstanding properties of cellulose nitrate plastic are water resistance, toughness and ease of fabrication.

One of the more recent applications of cellulose nitrate plastic is for hammer heads employed for assembly purposes by manufacturers of intricate machinery. Such heads will not mar delicately machined metal surfaces. Another is for small pen and pencil parts.

Some of the war uses of cellulose nitrate plastics include map covers, airplane windshields, range finder parts, grommets, propeller covers and glider parts.

Cellulose Acetate

Outstanding properties of cellulose acetate plastics are high mechanical strength, good shock resistance, toughness, high dielectric strength, transparency, colorability and ease of fabrication.

One important forward stride in the plastics field has been the marketing of high acetyl cellulose acetate molding powder. Technical difficulties previously retarded the wide use of this type of cellulose acetate which has good moisture resistance and dimensional stability.

Another recent development is the improvement made in the outdoor ag-

Plastic objects from cellulose acetate.

TECHNICAL DATA in this article based upon an address by F. C. Peterson, Cellulose Products Division, Dow Chemical Co., Midland, Mich. delivered at the recent Wood Products Conference at the New York State College of Forestry, Syracuse, N. Y.

DEVELOPMENTS IN LIGNIN PRODUCTS

ing characteristics of certain cellulose acetate compositions. Improvements of over 100 percent in discoloration and crazing are claimed.

Recent new applications of cellulose acetate (plastic and sheeting) have resulted from war needs, the major portion of these being for the aircraft industry. They include such uses as gas mask parts, airplane control knobs, first aid kits, ammunition rollers, radio direction finders, grommets and sheeting for cowling and cockpit covers, navigation charts and dimout screens.

Cellulose Acetate-Butyrate

Outstanding properties are high impact strength, low moisture absorption, good dimensional stability and weather resistance. The most significant recent development in this field has been the introduction of acetate-butyrate dry extruded fiber, in 1941. When woven, these fibers find application in such items as belts, handbags, millinery and costume jewelry.

Cellulose acetate-butyrate has found use as bayonet scabbards, gas mask parts, gun-stocks and forearms, blackout lenses, foot-tubs, signal whistles and instrument dials; these are but a few of its war applications. The sheeting finds its principal use at present as primary insulation of wire and cable.

Cellulose Ethers

Ethyl Cellulose

Ethyl cellulose, the most recent addition to the field of commercial cellulose derivatives, is now a widely used base for coatings, film and plastics. It has been available in quantity only since 1935. Ethyl cellulose plastic has improved chemical resistance, particularly to alkali, toughness at low temperature, high impact strength over a wide temperature range, excellent dimensional stability, low water absorption, good weather resistance and superior electrical properties. It is the lightest of the cellulose derivatives now on the market and is unusual in its compatibility with a variety of plasticizers and solubility in cheap solvents.

Developed to meet a war need, two new ethyl cellulose plastics made their debut within the last two years. One because of its elasticity and general flexibility has been named "ethyl rubber." Some formulations of this plastic can be used instead of rubber for certain applications. The other plastic was especially developed for its impact resistance and general toughness of molded articles at temperatures as low as —78 degrees F. Such moldings are also dimensionally stable at 160-180 degrees F. at 100 percent relative humidity.

More recently a plastic hot melt containing ethyl cellulose has been developed for use as a protective barrier against corrosion of metal parts during storage and overseas shipment. It is applied by dipping and because of the simplicity of the operation it has resulted in the saving of countless man hours both in the application of the coating and its removal in the field. Another unique and recent development is an ethyl cellulose plastic composition which upon heating can be poured into metal, wood or plaster of paris molds for forming dies, jigs and fixtures in the fabrication of aircraft parts.

Other Ethers of Cellulose

(1) Benzyl cellulose was developed to the commercial stage in England prior to the war. For economic reasons it was exploited there in preference to ethyl cellulose. It has excellent water resistance and electrical properties but because of its low softening point and poor stability its usefulness will probably be limited.

(2) Methyl cellulose first appeared in commercial quantities in the United States in 1939. It is soluble in water under, approximately, 125 degrees F., and insoluble in organic solvents. It has a high melting point and therefore it is unsuitable for plastics. Methyl cellulose finds wide application in the pharmaceutical industry where it is used in creams and lotions and as a tablet granulating agent. The textile industry makes use of methyl cellulose as a thickening agent, and the paper industry as a sizing agent. It is well established as an adhesive for leather pasting and as a binding agent in the pencil industry in the manufacture of colored leads. Methyl cellulose sheeting is also commercially available.

(3) Carboxy-Methyl cellulose is the most recent cellulose ether to appear in commercial quantities in the United States. During the past summer announcement was made of the availability of salts of this derivative. It is believed that carboxy-methyl cellulose will find wide and varied applications in the pharmaceutical, food, paper and textile industries.

Lignin Plastics

As previously mentioned natural woody growth contains in addition to cellulose, about 25 percent of a bonding resin known as lignin. Inherently, lignin is aromatic in nature and for this reason it can be made to form

(*Continued on Page* 82)

Yarns made from wood pulp rayon.

Utilization

By
ROBERT S. ARIES, *Field Director*
Northeastern Wood Utilization Council

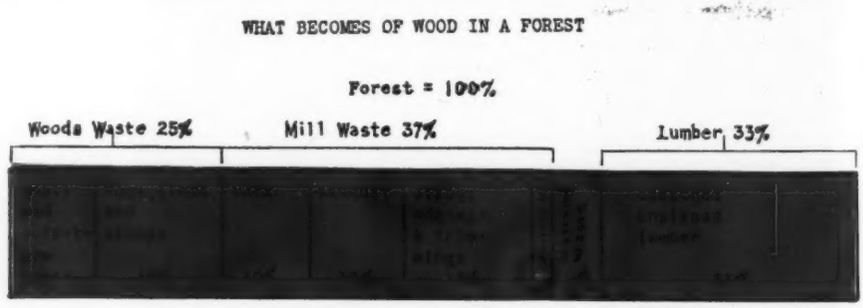
The forests of the United States have been a source of untold riches for centuries, yet the processes of utilization have generally been haphazard and inefficient. It is a painful fact that more than two-thirds of the forest drain is lost during manufacture and use. About a ton of wood per thousand board feet of lumber is left at the sawmill as sawdust, slabs and edgings, while three tons are left in the woods as tops, limbs, broken and cull logs, cull trees and non-commercial species.

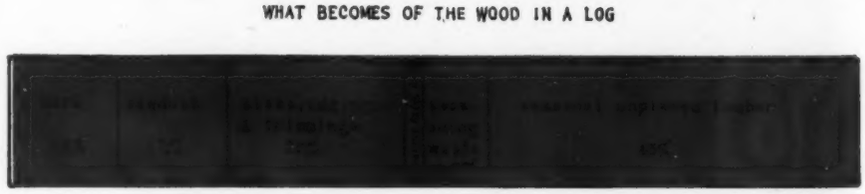
Much information on forest resources and their utilization has been made available. Unfortunately some of this contains statements which result in confusion or misunderstanding in the mind of the public on the actual forest situation. Some even tends to promote the idea that there is nothing to worry about. Since one-third of the area of the United States is forest land, optimists think that there will always be an abundance of timber. But it does not follow that forest land necessarily means productive timberland. Of some 630 million acres of forest land in the United States, approximately 168 million acres is of non-commercial types—that is, alpine, semidesert, chaparral or other forest land types not suited or not available for growing timber of commercial quality or quantity, although much of it is valuable for watershed protection, grazing, wildlife, or other purposes. Of the 462 million acres of commercial forest land, some 77 million acres is virtually non-productive as a result of destructive cutting and fire. Of the remaining area all but about 100 million acres has been cut over, and a large part of this cut-over land is now producing at only a fraction of its potential capacity.

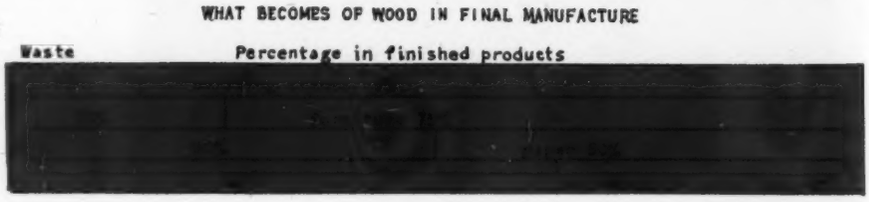
The amount of usable wood that can be supplied annually does not depend upon the acreage and character of the land alone. It depends fully as much on the character of the growing stock, i. e., the number of remaining trees large enough and of the proper kinds to produce good sawlogs, piling, pulpwood, etc., in a short time. Therefore, our growing stock, or forest "capital," must be maintained if it is to yield regular "interest" in the form of usable products.

Besides, the quality of the second-growth timber is much inferior to that of the original stands insofar as lumber is concerned. That is where common sense and a scientific attitude is of importance. The creation of organizations such as the Northeastern Wood Utilization Council, for example, is one answer to the problem. The forests of the Northeast, like the ones of several other regions, were pronounced as "doomed" by pessimists even before the turn of the century. Yet sawmills are still humming and by means of utilizing low grade materials and wastes, the area can continue to be a prime manufacturer of forest products. For instance, size and shape do not matter to any great extent in the case of the chemical industries. The natural answer to the problem of waste wood utilization is in chemical conversion.

It should be clear that in most cases the lumber would still have to carry the major part of the cost. New uses of wood should not be considered as competitive materials of lumber. The latter still remains and will probably continue to be the main product of the forest but it will not be the only product as up to now. Other wood materials should supplement and enlarge its scope as well as increase its value (or as we would say, decrease its cost) on account of the utilization of parts of the tree which were formerly wasted. In the future the lumberjack, forester, chemist and executive should work together in a com-







OF WOOD WASTE

Left: Typical edgings. After cutting into four foot lengths they will be picked over for lath stock and short length lumber. Above: Objects made from plastics derived from the components of wood.

prehensive program for the benefit of all. This is the aim of the Northeastern Wood Utilization Council and other forward looking organizations.

Chemical utilization of wood waste and wood is oftentimes represented as an entirely new discovery with amazing and revolutionary potentialities. It is our opinion that this attitude has sometimes created more harm than good. In the words of the secretary of our Council, E. L. Heermance, "those who really work with wood are used to the slow growth of trees and should get accustomed to a solid and tested foundation rather than be impressed by the mere newness of a development." This does not mean inertia or resistance to new ideas on his part. The foundation of our Council as well as the numerous research projects with which we are now dealing bear eloquent witness about it.

The Use of Sawdust and Shavings

As seen in Fig. 2, sawdust is estimated to constitute between 10 and 13 percent of the total content of the log, but efforts to use it should be tempered with caution. A thorough understanding of marketing costs and of the consumer's demands are the first requisites to success in this line.

Because of their close contact with consumers and their superior handling facilities, the sawdust dealers in the large cities are in the most advantageous position to handle the sawdust from lumber mills and woodworking plants. The sawdust accumulating in the woodworking industry is greatly in excess of that which can possibly be consumed, and only under certain conditions, such as at present due to to the shortage of other fuels, is its profitable utilization an economic possibility.

The profitable disposal of sawdust is limited to certain factors that should be carefully considered, among which are (in order of importance) (1) freight rates to the consuming centers, (2) handling costs at mill, (3) quality of sawdust available, (4) quantity of sawdust available, and (5) limited present uses. To the sawmill or planing mill operator, sawdust is merely sawdust, but to the consumer it is a material which he employs for a certain definite purpose and it must possess the qualities that fit in with his specific needs for that purpose. Among the characteristics which he must consider are color, bulk analysis, screen test, chemical reaction, color reaction, degree of dryness, and the presence of bark, resin and other types of foreign materials. Some manufacturers of leather, for example, will demand a very fine grade of maple sawdust for the dampening of goat hides, while others have found coarse pine sawdust better for their particular needs. Whether or not this wide variation in the kind of sawdust demanded is due to prejudice or to the nature of the different kinds of leather being processed is a moot question, but in any case it is certain that the sawdust used must not impart any color. Many leather manufacturers in the past few years have turned to dampening their hides by dipping or spraying, although the sawdust processing is admittedly superior. This new practice is doubtless due in a

(Continued on page 92)

ROBERT S. ARIES, known to our readers through his articles on plastics, wood-chemical developments, fuel briquettes, wood flour, etc., published during the last few years in the AMERICAN LUMBERMAN, *is a chemical engineer, specializing on wood technology. Mr. Aries has done extensive research on forest products utilization and developed several processes in the field of wood-chemistry. At present, he is heading the technical activities of the Northeastern Wood Utilization Council, an association for research and application of new uses for forest products.*

Alchemy

AT WORK ON WOOD

ONE OF THE MOST spectacular achievements of recent years is a chemical treatment which converts natural wood into a totally different substance. Tentatively named "transmuted wood", the new substance has rather striking chemical and physical characteristics. Contrasted to natural wood, it is fire resistant, moisture resistant and dimensionally stable. Transmuted wood is closely akin to the plastics.

The lumberman's conception of wood is fundamentally different from that of the chemist. Lumber has always been classified according to species and grade because the various species, differing widely in strength, appearance and other physical characteristics, must be used in applications to which they are suited.

Chemically speaking, however, all wood is composed of lignin and cellulose, and the various species differ only in the distribution and arrangement of these two substances. So to a chemist all wood is basically the same—and he is apt to consider a beautifully finished board as just so much raw material ready to be worked on with the brew from his test tubes.

Disturbing as that view may be to some quarters, it nevertheless bids fair to broaden greatly the practical uses of wood. For centuries lumber has been a satisfactory building and construction material with almost universal applications. In the future it might be even more widely used. In all probability transmuted wood will compete successfully with many types of plastics and metals. It is equally probable that some types of cheap and plentiful softwoods can be transmuted and used for applications formerly restricted to comparatively scarce and expensive hardwoods.

Those replaced hardwoods, however, will not go begging on the market. When treated they will combine the beauty of wood with the strength of steel and should have many applications in home building and industry.

There are many types of wood which have never been used commercially because of their undesirable physical qualities. The chemists believe that transmutation will make it possible to use such woods safely for many building purposes.

So far as is known all types of wood can be transmuted, but the different species vary in their ability to absorb the treating solutions rapidly. Heartwood and sapwood of the same species also differ in the treating time required.

Different types of chemicals—such as the phenolic resins and the urea resins— have been used with notable success in the transmutation of wood. Furthermore, it is possible to vary the amount of treatment. Wood may be partially or totally impregnated, partially or totally compressed, depending on the desired results.

For complete transmutation of wood a "full cell impregnation" method is generally regarded as the most satisfactory. It works like this:

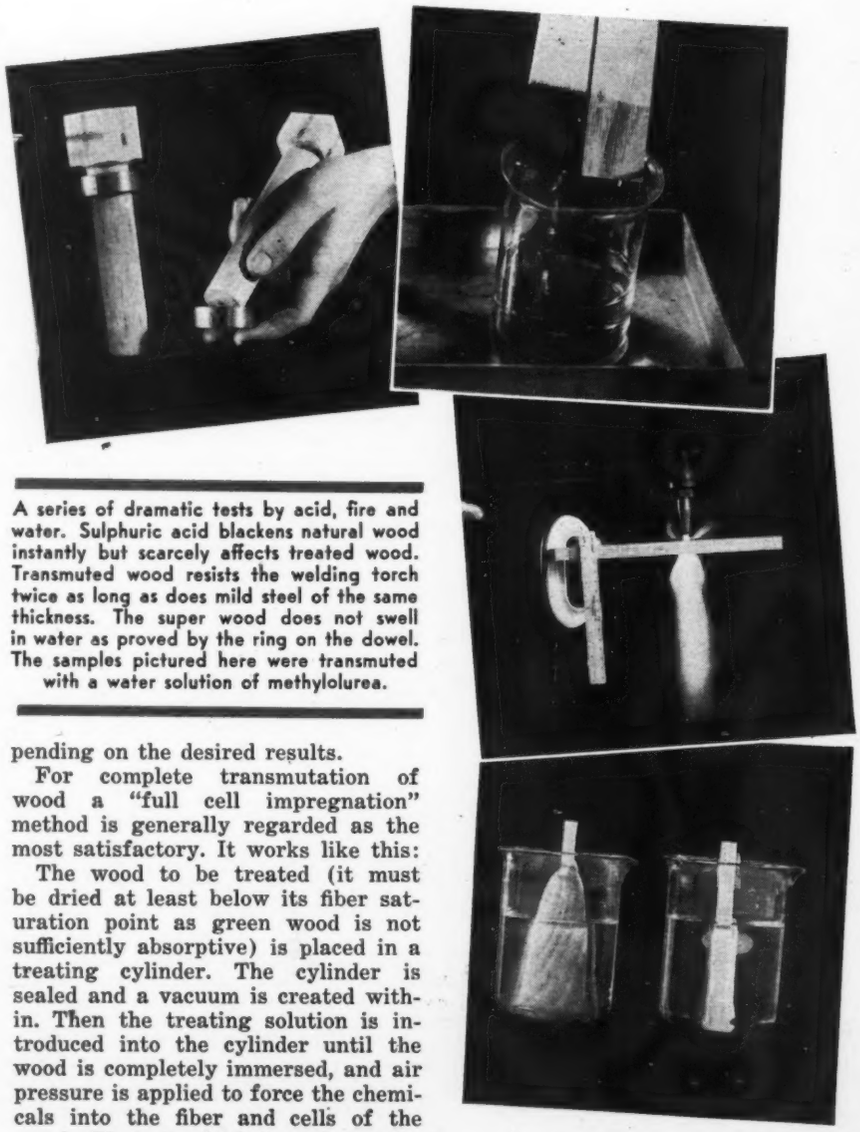
The wood to be treated (it must be dried at least below its fiber saturation point as green wood is not sufficiently absorptive) is placed in a treating cylinder. The cylinder is sealed and a vacuum is created within. Then the treating solution is introduced into the cylinder until the wood is completely immersed, and air pressure is applied to force the chemicals into the fiber and cells of the wood. Time required depends on the type of wood and on the degree of impregnation desired, but 20 minutes is about the average. Then the solution is drained from the cylinder and the wood is removed. Kiln drying completes the process—or the wood may be air dried and then exposed to heat.

The resulting product is called "impreg." If pressure is applied along with the heat, the substance can be compressed into a much denser, harder material with greater dimensional stability. It is then called "compreg."

There you have a material which looks like wood but which has been transmuted into an entirely new substance.

In some cases partial treatment may be desirable. It is possible to "case harden" the wood by treating the surface, leaving the center soft and comparatively resistant to shock.

For some time at least impregs and compregs will probably cost more than natural lumber. However, widespread adoption of transmutation might eventuate in reduced costs.



A series of dramatic tests by acid, fire and water. Sulphuric acid blackens natural wood instantly but scarcely affects treated wood. Transmuted wood resists the welding torch twice as long as does mild steel of the same thickness. The super wood does not swell in water as proved by the ring on the dowel. The samples pictured here were transmuted with a water solution of methylolurea.

Photos: Courtesy of du Pont

Greetings from

Hopefully, today, the oppressed of All nations look toward America as the horizon of their ultimate Peace . . . and their right to the Pursuit of Happiness.

May the Peace of Him who rules all destinies, preserve the "Peace of America" we have so long enjoyed, and be yours at Christmastime . . . and through the years to come.

FROM

BOOTH-KELLY

Thanks for your business this past year. While we haven't been able to meet all needs, we have endeavored to do the very best possible within the regulations.

May the New Year bring the Victory all of us desire—when we shall welcome the opportunity to restore our full service to all customers as in prewar days.

DOUGLAS FIR

Dimension	Flooring	Ceiling
Drop Siding	Finish	Stepping
Mouldings	Casing	Base, etc.

We are headquarters for Trade-Marked and Grade-Marked Douglas Fir Lumber.

The Booth-Kelly LUMBER CO. EUGENE, ORE.

TWO MILLS—SPRINGFIELD & WENDLING, ORE.

Automatic length sorter. Boards going into this machine on edge are automatically tilted

Better Lumber

(*Continued from Page* 43)

bodies are lighter in weight and can be made as durable and as efficient as those made of metals.

Several lumber companies have installed or are planning to put in treating cylinders to treat lumber and timbers with creosote, zinc chloride, and other preservatives to increase their life in service. The increased knowledge of termites and fungi have given architects and engineers a better basis of specifications for structures exposed to influence of insects and decay. In the postwar period more lumber is going to be used where it will perform its best service. Some companies have made real progress in impregnating woods susceptible to decay when used as foundations, exterior finish and for doors, windows, framing, etc.

Sawing Improvements

The so-called Scandinavian gang saw, introduced on the West Coast some years ago, has proved to be very successful in sawing small size logs into 2x4, 2x6, and 2x8 dimension and common boards. It is not possible to turn the log on the carriage as with the band saw—therefore, very little of the upper grades are produced by this method. It is the type almost universally used in Europe. It produces accurately-sawn lumber but is not adapted to the big old virgin timber. It is used principally on second growth and small size fir and pine logs in the West. It hasn't been generally introduced in the South or East as yet, but may prove its worth in both sections.

A roller pressure guide for band saws has been developed to meet the demand by some sawyers who believe that they can secure greater efficiency out of their mills by keeping the saw in alignment, and setting the top wheel back about ⅜ to ½ inch by means of the cross line screw.

The Allis-Chalmers Co. designed a coupling to apply to the set shaft of large carriages used on the Pacific Coast which allows adjustment for each knee to 1/16 inch. This permits the final adjustment to bring the knees into perfect alignment and results in sawing better lumber.

The same company has also designed a trough with bevelled sides which allows logs from 6 to 12 inches in diameter to be moved through its length by means of a rope feed. There are two saws mounted over the top of the trough. They are adjustable so that a slab may be sawed from each side of the log at one time, leaving the cant or center of the log for use as cross ties, boxed heart timbers, etc.

Some lumber mills have introduced a method of cutting lumber and timbers in lengths to exact sizes, thus reducing the amount of work necessary for trimming on the final job. The ordinary cut-off saws do not provide this accuracy. Allis-Chalmers has developed a so-called "railway cut-off saw" which is mounted on a foundation with live rolls insuring accurate alignment with the fixed measurements at all times.

Lumber Handling

Within recent years, carrier trucks have been developed to a high degree of efficiency to reduce transportation and handling costs about the larger lumber mills and lumber shipping centers. These carriers quickly pick up lumber packages assembled for the purpose and drop them with a minimum amount of effort and time. They operate at speeds up to 35 miles per hour.

Since the development of carriers to move lumber from the green sorter chain to the lumber piles in the yard; also from the yard to the planing mill;

"INSULATE NOW!"

U. S. GOVT. SPOKESMEN ADVISE!

TELL ME, MR. DEALER, WHOM CAN I GET TO DO THE JOB FOR ME QUICKLY?
ZONOLITE IS YOUR ANSWER, MR. HOMEOWNER. YOU CAN INSULATE YOUR ATTIC YOURSELF IN 3 OR 4 HOURS . . . EASILY!

Our dealers are cashing in *BIG* right now because *ZONOLITE* is so *EASY* to install!

Threatened with a 35,000,000 ton fuel shortage, government authorities are daily urging homeowners to insulate. With Zonolite insulation your customers can do the job themselves. They simply pour Zonolite Granular Fill Insulation between the joists in their attics and level it off to the desired thickness. Can also be poured in side walls. Saves up to 40% on fuel bills.

3 FAST SELLING FORMS OF ZONOLITE

In addition to Zonolite Granular Fill Insulation, you have Zonolite Insulating Concrete Aggregate which is used instead of sand and gravel in concrete to make warm, dry floors and walls. And Zonolite Plaster Aggregate is used instead of sand to make a plaster that insulates against heat, cold and sound.

2 BIG MARKETS
Farm and Home

While Zonolite Granular Fill Insulation has a tremendous demand for home insulation, Zonolite Concrete Aggregate is needed on every farm to produce warm, dry floors and walls in hog houses, poultry houses and dairy barns. Cuts farrowing losses—increases egg and milk production.

FREE Work Sheets For Your Customers
MAIL COUPON

Send for a sample set of our FREE Work Sheets which show your customers how they can insulate their homes and farm buildings themselves. Also ask for our attractive dealer offer. Mail coupon.

Better egg production all winter in laying houses insulated with Zonolite.

Warm, dry Zonolite Insulating Concrete floors materially cut farrowing losses.

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INSULATION
Permanent as the Earth Itself

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DEALERS:
Get the Facts
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TODAY!

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Please send sample set of work sheets and your dealer offer on all 3 forms of Zonolite.

Firm Name.....

Your Name.....

Address.....

City.....*State*.....

SUPERCEDAR
NATIONALLY ADVERTISED
AROMATIC RED CEDAR
CLOSET LINING LUMBER
Packaged and Sealed
GUARANTEED
90% Red Heart
or Better

Our production is drastically curtailed by reason of problems related to the war effort, but we are doing our level best to partially fill demands; at the same time planning for that day when we can again serve our customers with enough—on time.

BROWN'S SUPERCEDAR CLOSET LINING
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PRODUCT OF
GEO. C. BROWN & CO.
GREENSBORO, NORTH CAROLINA
LARGEST MANUFACTURERS OF AROMATIC RED CEDAR IN THE WORLD

CHAPMAN & DEWEY
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Memphis, Tenn.
Manufacturers of "C & D" Brand
OAK FLOORING
and
HARDWOOD LUMBER
From
FAMOUS ST. FRANCIS BASIN
☆
Wire for quotations

or directly to the dry kilns or to the shipping dock or vessels along the wharves, lift trucks have been devised to lift these packages either in the green condition or after drying to wherever needed.

These lift trucks travel at speeds up to 20 miles per hour. They replace a tremendous amount of labor in handling lumber, particularly in elevating lumber from the old buggies or trams from the alleys to the tops of the piles. Although these carriers and lift trucks mean the investment of considerable capital, they have proved to more than pay for themselves in the reduction of labor costs. In many cases, the saving of time in addition to labor is of paramount importance, especially when coastwise or ocean going vessels are to be loaded.

Lower Production, Higher Profit

Many lumber manufacturers, who happen to be large owners of forest properties that are being put on a sustained yield basis under a definite plan of forest management, are attempting to make their logging and manufacturing processes more efficient so that they can realize as much profit from a smaller annual production as they did from a larger production some years ago. For example, some companies which customarily turned out from twenty to thirty million board feet of lumber annually may find that on a sustained yield basis they can produce only twelve to twenty million board feet yearly. By more efficient logging practices, by improved technical manufacturing methods and improving the value of the end-product it is possible to cut down certain expenses and increase the value of the final product, thus leaving the company in as good financial condition or perhaps better than it was before.

By incorporating some of the methods briefly mentioned under the above headings, some of these companies have been able to sell tops in the woods for pulpwood, have saved a good deal of loss resulting from careless log bucking methods in the woods whereby over-runs of three to twelve inches in log lengths were made when a one-inch allowance for end trimming

Rotary Lift Co. drawing
Hydraulic lifts are usually used in lumber mills to keep the top of lumber piles even with working machines.

in the sawmills proved to be sufficient. Also mechanically powered chain-saws permit cutting very low stumps, thus adding some volume to the butt logs which generally contain the highest percentage of upper grades.

Trends Toward Small Mills

As long as there are large stands of virgin timber available in the far West there will continue to be huge sawmills, many producing from 100,-

Above: Device for loading logs on flat cars. J. Neils Lbr. Co. photo

TO OUR LOYAL CUSTOMER-FRIENDS,

the Lumber Dealers Of America

As another war-torn year draws to a close, we of Frost pause in deep appreciation of the immeasurable help received from our many dealer-friends. Not help in the way of dealer orders; but in spirit of understanding expressed when, because of war requirements, we have been unable to fill their orders. In the light of these sentiments we have found the extra stimulus needed to meet crucial war needs in full stride, and at the same time have kept prepared and ready to switch over to full peace-time production the moment Victory permits.

Thus, in all that the spirit of "Merry Christmas" holds, we extend you, our dealer-friends, a full measure of the Season's Greetings. May the coming year bring you Health and Happiness . . . and the Prosperity of a New Era of Peace and Progress.

FROST LUMBER INDUSTRIES, Inc.

SHREVEPORT, LOUISIANA

ST. LOUIS, MO. **MT. VERNON, N. Y.**

000 to 1,000,000 board feet daily. But in many sections of the Rocky Mountains, the South, the Lake States and the Northeast, there have been installations of many small, portable mills to saw the smaller scattered stands left by the big mills, as well as to cut the regrowth. A very large part of the lumber cut east of the Mississippi River comes from second, third and fourth growth timber. Lumbermen, as well as foresters, are learning that trees actually do grow and sometimes more rapidly than expected, especially when protected from fire and when efficient methods of forest management are practiced.

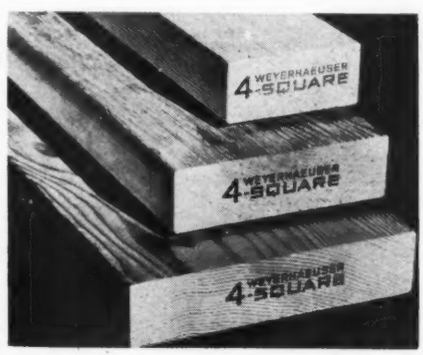
Within recent years a number of small portable band mills have been installed. Many of these are in permanent locations because, with improved highways and better trucks resulting in lower operating costs, logs often are hauled 20 to 80 miles or more to the sawmills whereas these distances formerly were considered prohibitive. In New York State alone about seven small 42 or 48 inch band sawmills have been installed to replace circular mills. In the South these small band mills have been mounted on flat cars and moved from one location to another on the common carriers. Even the portable circular mill has undergone considerable improvement and, with the development of concentration yards, notably in the South, to kiln dry and plane the rough lumber from these small "pecker-wood," "sea-weed" or "coffee-pot" mills, considerable improvement in the quality of the product has been noticeable. Even some of the larger lumber companies, with their huge band sawmills, have installed small portable band and circular mills in outlying sections of their timber holdings. For example, the W. T. Smith Lumber Co. mill at Chapman, Ala., augments its production by the use of a small band mill which is portable as to construction, but actually is left at a permanent location at Greenwood, Ala., several miles north of Chapman, but still within their large forest properties.

Summary

The above new developments and improvements in producing lumber are indicative and symptomatic of a new and progressive spirit within the American lumber industry. There are many enterprising companies that are fully aware of the possibilities of putting a better lumber product on the market during the postwar period.

The industry is represented by at least 35,000 producing sawmill units. The industry is organized largely through regional manufacturing associations and the National Lumber Manufacturers' Association at Washington. Some of these associations have been very alert-minded in developing new trends and possibilities. Large individual lumber companies have taken the initiative in developing and studying new outlets for their lumber product.

Surely the industry will give careful thought to further improving its product, because competition for the big market ahead will be very severe. The lumber industry is alive to this challenge and to the opportunities that lie ahead.



A finished, precision manufactured product typical of that manufactured at modern well equipped mills. Exact lengths, square ends, thorough seasoning, eased edges and smooth surfaces are features.

SURE CURE FOR BLURMITIS*

Rx Prescribe Marlite

DIRT HEAT GREASE ACID FUMES ALKALIS OILS

YOU'RE THE DOCTOR . . . and what you "prescribe" for your customers in the way of walls and ceilings in post-Victory buildings will do much to determine the amount of your future business, your community standing and your bank balance. So take no chances. Install dependable materials that assure customer satisfaction, provide interior surfaces of . . .

PLASTIC-FINISHED MARLITE! This attractive, sanitary and durable pre-finished interior wall and ceiling material has the *pioneer high-heat-bake finish* that seals the surface against the penetrating action of dirt and moisture—*against Blurmites!* Marlite is quickly and easily installed for new construction or remodeling—without special tools. Marlite is easy-to-clean—never needs repainting or refinishing; retains original beauty and luster for many years; is moderate in cost. *Many Marlite colors and patterns are immediately available on suitable priorities!*

**Blurmitis—destructive action of Blurmites (oil, grease, heat, dirt, acid fumes, alkalis and strong cleansing agents) harmful to many wall and ceiling surfaces.*

SEND FOR A SAMPLE . . . TODAY

Marlite is normally available in a wide selection of colors and patterns with harmonizing moldings in presdwood, plastic, wood and metal. Send for a sample and complete information — and remember Marsh Engineers are ready now to help with plans and specifications. Write today!

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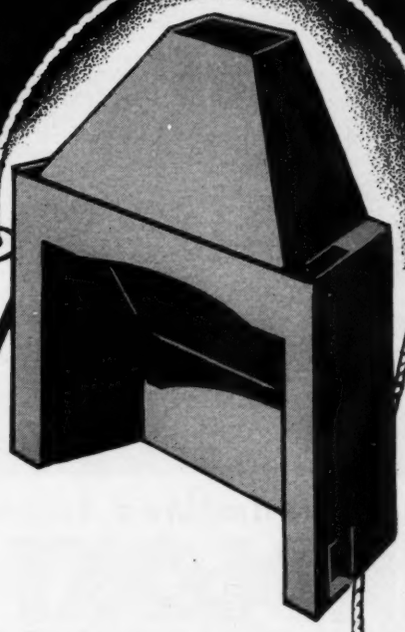
PLASTIC FINISHED WALL PANELS • FOR CREATING BEAUTIFUL INTERIORS

Will the Fireplaces You Sold Before the War Sell *New* Fireplaces for You After Victory?

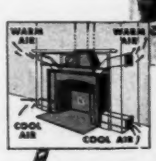
Yes... if you sold the

HEATILATOR FIREPLACE



Everybody who shivered during fuel-rationed winters is going to want a HEATILATOR FIREPLACE in his home *just as soon as possible*. He's going to want a HEATILATOR because it's a fireplace he can use to stretch furnace fuels and to cut fuel bills spring and fall. A fireplace he can use to augment furnace heat when the mercury drops out of sight. A fireplace that will pinch-hit for the furnace when repairs are needed. And a fireplace that cures all the usual causes of smoking.

He's going to want a HEATILATOR FIREPLACE particularly because his friends and acquaintances have told him about the HEATILATOR—And every HEATILATOR sold before the war is going to help sell more HEATILATOR FIREPLACES when victory comes. If you were one of the dealers who handled HEATILATOR before the war, your pre-war sales are going to bring you new business after V Day. If you didn't handle HEATILATOR, remember there's a big backlog of orders waiting for you. Find out today. *Heatilator Fireplace units will be available just as soon as building starts.*



HEATILATORS *for Summer Cabins and Camps*

Because it circulates heat to adjoining rooms, the Heatilator Fireplace is ideal for camps and cabins — makes them usable weeks longer and for winter week-ends.

HEATILATOR, Inc.
943 E. Brighton Ave., Syracuse 5, N. Y.

HEATILATOR

Research Builds Markets

(*Continued from page* 39)

us and Providence provided the markets. Our stewardship of these markets has not been brilliant or even intelligent.

A Bit of History

In 1918 almost 100 percent of office desks were of wood construction. Twenty years later 50 percent were of wood. Less than 30 years ago practically all file cases were of wood but the picture has now changed so that during the last peacetime year about 7 percent were made of wood. These are outstanding examples of changing market conditions, but they are by no means unique. There are dozens of other former wood uses that have been replaced either in whole or in part by substitute materials. Examples are automobiles, kitchen cabinets, refrigerators, Venetian blinds, railroad cars, airplanes, porch furniture, flooring, etc.

An analysis of the situation indicates that we have lost a large part of these markets because of two things or, to be more exact, because of a combination of two factors:

1. Price competition, and
2. Unsatisfactory utility over a period of time.

War Conditions

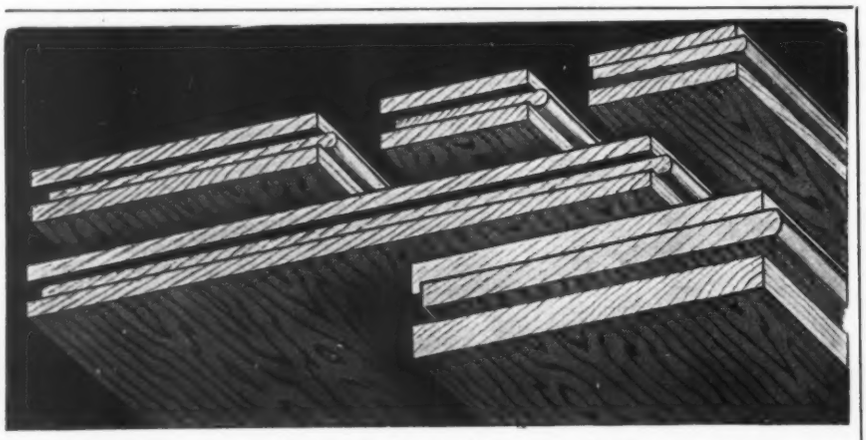
Immediately after Pearl Harbor "price competition and product utility" ceased in a large measure to be balancing factors. Quality and price were only secondary considerations. The forest products industry was handed, even compelled to take over, markets which it had been forced to abandon years ago. The opportunity was golden but the requirements so severe that in general we did not have the ability to make the gains secure.

Inability to meet this challenge became evident early in the period. Actually the general use we made of this opportunity will probably be a new and special weapon in the hands of our competitors. That the industry sacrificed itself in a patriotic effort to discharge a war obligation will in no manner affect our ever present war on competition. We failed to place ourselves in a position calculated to retain these restored markets because the industry resorted to manufacturing processes which in some instances were 50 years or even older. These same practices failed us in the late twenties. What we once lost and then gained through the fortunes of war, we will lose again except in those instances where research and product development, quality and utility have been advanced to outdistance the nearest competitor.

During the first months of raw material scarcity, wood office furniture was made in large quantities in which every effort was put forth to make wood products similar in appearance to articles of steel. This equipment on first glance seemed to be a fairly accurate replica. It was only in attempting to use the equipment that the very poor quality of the furniture became evident. Drawers fitted inaccurately; construction throughout was of the cheapest and flimsiest type. Many of the desks were sold by firms who had been in the metal desk business for a long time. It even appears that competitors worked out designs and methods for construction calculated to draw public attention to the fact the wood desk is inherently an inferior product. This statement does not apply to those old time and outstanding desk manufacturers, for indeed most of them strove to the utmost to maintain reasonable standards.

One of the bright spots in the picture is the marine laminating program. At the start of the war, construction of wood boats was just about on the same plane that it was during the war of 1812. Fortunately, the groundwork had been laid for a research program that was intended to develop synthetic production of long length and variously shaped durable timbers. Today research and the business built on it should assure an opportunity to participate in the new pleasure boat industry that will arise after the war.

The principal point to be remembered is that here is an example where through intelligent research the industry as a whole will benefit, and furthermore this advancement has



The Streamlined Lumber of Tomorrow

END-LOKT ESSCO

TRADE-MARK

The war effort is still taking more tons of wood than of steel or any other commodity. The use of wood is expanding in all directions. However, you and your customers need not be alarmed. The supply of lumber will be ample for your post-war operations. It will be better lumber so designed and milled as to cut on-the-job costs of labor, material, and time. Talk to your customers now about these 12 advantages of Essco End-Lokt lumber.

1. End-Lokt lumber forms solid, continuous floor, sub-floor, wall or deck surfaces because ends as well as sides interlock.
2. End-Lokt lumber eliminates close end nailing and consequent splitting and lessened nail holding strength.
3. End-Lokt lumber eliminates chatter resulting from one plain butted end joint falling over another.
4. End-Lokt joints can fall where they may, i. e., they need not break over a joist or stud bearing. This saves sawing, nails and nailing necessary to make two ends of plain end lumber butt over joists, studs or rafters.
5. End-Lokt joints falling between stud or joist bearing are as firm and practically as strong as if the piece fully spanned the stud or joist bearing points.
6. End-Lokt lumber saves the extra cost and waste involved in diagonal sheathing, subflooring and roof decking. Ends need not be sawed except at windows, doors and the end of the run. Any piece sawed off at these points can be used as the starter for the next run.
7. The cutting, handling and nailing costs saved by End-Lokt lumber brings the extra strength, continuous surface advantages of all diagonal sheathing at little or no extra cost.
8. Equal savings and advantages are gained in the use of End-Lokt drop siding, ceiling and porch lining lumber.
9. End-Lokt, the lumber of tomorrow, makes possible greater recovery of better grades. This elimination of waste to a great extent offsets the extra cost of extra milling. Thus, End-Lokt milling operates as an economic factor in the supplying of plus value lumber at no premium in price. Especially is this true when the saving in labor costs it effects are taken into consideration.
10. Bundled in shorter lengths, End-Lokt lumber is handled easier and more speedily by one man on the job.
11. Bundled End-Lokt lumber gains freight advantage in shipping and "yards" in less space with less handling.
12. Bundled End-Lokt lumber simplifies the inventory by reducing the necessity of carrying large assortments.

Trade-Marked—Grade-Marked

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EXCHANGE SAWMILLS SALES CO.

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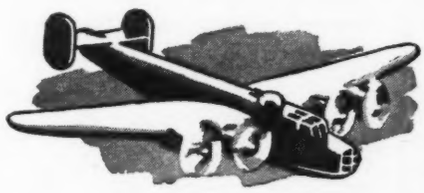
Makes Better-Than-Ever Plywood for War Today... for Better Living Tomorrow

Out of a wartime test tube comes the new and greatly needed KIMPREG!* Not a plywood—not a conventional plastic laminate—KIMPREG is a remarkable surfacing material for bonding to the base plywood in conventional plywood hot presses. When applied to plywood, the finished product is more durable—has a higher flexural strength than ordinary plywood—offers resistance to vapor permeability, abrasion, decay. Application of KIMPREG assures moisture-resistance, easy washability. This new plastic surfacing material will make your product scuff-proof—it won't stain—the finish will wear better than paint.

In the post-war world KIMPREG will open new fields for the use of plywood. It may offer new opportunities for your product. It may well represent important savings of money and material to you. So be ready to take advantage of the tested KIMPREG plastic surfacing for plywoods when conversion to a peacetime economy comes. Write for FREE booklet today.

KIMPREG (Trade-Mark) means Kimberly-Clark Plastic Surfacing Material



TODAY—The Army and Navy use KIMPREG for bomber floors and doors, packing cases, luggage, hutments, parachute folding tables.

TOMORROW—KIMPREG will be used in construction of prefabricated houses, refrigerator car linings, table tops, piano and radio cases, etc.

Among the users of KIMPREG are: Buffelen Lumber & Manufacturing Company; Olympic Plywood Company; Washington Veneer Company; and The Wheeler, Osgood Company; all of whom are currently producing a Douglas Fir Plywood surfaced with KIMPREG. This product is sold under the trade name of Inderon.

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War Products Division
Kimberly-Clark Corporation, Neenah, Wisconsin

Please send me FREE KIMPREG book.

*Name of Co.*_____ *Att. of:*_____

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been handled in such a way as not to hinder the volume of war production but to increase it. It is useless, except for historic purposes and as an object lesson, to predict what could have happened in some of the other fields such as truck bodies, office furniture, refrigerators, etc., had we been able to take advantage of the market opportunity for these articles as we did for marine laminating.

The Problem

Very simply our problem can be stated in the following terms:

a. We need an analysis of the various wood products markets to determine which ones are worth keeping and fighting for and which ones should be discarded as not worth the effort.
b. We need to determine which markets appear to be most critical from the competitive standpoint and therefore need a maximum of research development.
c. We need to find out why we are in danger of losing these markets.
d. We need to set up a program of research and investigation designed to improve the product and fit it for a better competitive position.

Returning again to the wood desk as an example, work is now under way in laboratories to improve it, but before getting out the test tubes it was necessary to find out what is wrong with the present type. A survey disclosed the following. The wood top was too soft; it marred easily and with use the finish became shoddy. Furthermore, the conventional type varnish finish cannot be kept clean. In one large government department we were told that the employes preferred metal desks because the janitors washed the writing surfaces every night with water and soap; on the other hand, wood desks were polished with an oily rag usually not too clean. In another department we were told that the feminine employes were prejudiced against wood desks because the splinters from the rough edges ruined their hose. Still others objected to wood desks because the drawers stuck or because of a peculiar idea that a wood desk was not fire resistant and therefore a dangerous place to store papers and a building hazard.

The answer is of course to engineer a new type of wood desk wherein these deficiencies have been removed. It is not an easy task, nor can it be accomplished at the sawmill or at the desk factory. It is a job first of all for the research laboratory. We know how to impregnate wood with various chemicals so that the wood can be made relatively stable to dimensional changes, so that it is harder than normal wood, and so that it has other properties such as increased fire resistance, decay resistance, etc. But it is a far cry from the laboratory stage to practical manufacture, especially for such articles as desks and other furniture.

Theoretically, we could make an ideal desk, one that would answer every service requirement and for appearance and utility would shame its nearest competitor. This could be done with present facilities but in doing so one would have to forget about the cost of manufacture, thereby destroying the balance between price competition and utility value. It is the job of the research organization cooperating with the producers of the material to find some way to do these things without adding largely to manufacturing costs. In general, it is safe to assume that when anything is done to a piece of wood the cost rises rapidly. Probably the cheapest treatment available for hardening lumber and giving it certain other desired qualities costs at least 6 cents per board foot. Thus an article such as a desk, which contains from 75 to 100 board feet of treated lumber, would be increased in cost from $4.50 to $6.00.

This increase in cost would be ruinous to stability of "price competition" unless of course the treatment enhanced the desirability of the product to such an extent that the consumer preferred to ignore price. To develop an improved commodity simply on the basis of increased utility value, regardless of cost, is a poor bet and the chances are the manufacturer of com-

Greetings

To Our Fellow Lumbermen
To Our Loyal Customers

. . . with every good wish at Christmas and throughout the NEW YEAR

Mobile River Saw Mill Co., Inc.

Saw Mill, Oak Flooring Plant and Planing Mill

★

Address:
Mt. Vernon, Alabama, U.S.A.

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Cable Address: MRSCO

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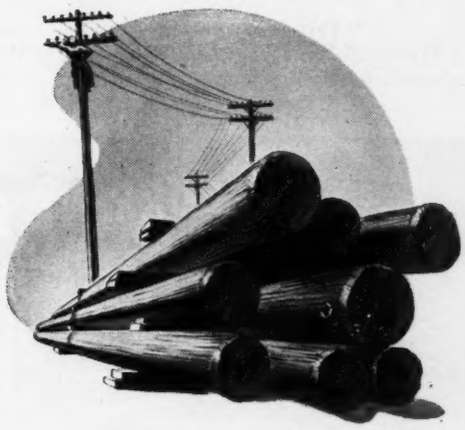
Export, Coastwise and Pacific Coast Shipments move via Mobile, Ala.

Manufacturers of
Band Sawed Hardwoods
Cypress
and High Grade
"Mt. Vernon"
Brand Oak Flooring

DON'T PUT UP WITH TERMITES!

Mold and decay assume different forms under different conditions. Hence, varying treatments are required if the costly inroads of spoilage are to be prevented.

That is why there are seventeen related products in the Dowicide group—each is designed for a specific job—and each has proved itself in that assignment.



In the lumber industry, for example, there is a special Dowicide that protects wood against rot and termite attack for long periods of time. Application can be made by pressure impregnation or by tank soaking. After treatment, lumber is paintable, nonbleeding, and easily handled.

Whatever your problem in respect to decay, there is a Dowicide to help you. Don't put up with rot or termites—write the Dowicide Division for complete information.

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peting products would leave no stone unturned to meet technical improvements. Furthermore, he would know that beforehand he would have to obtain improved quality at a cost somewhat less than that of his competitor. In this instance we would be as bad off if not worse than we were before. It might seem that because of these factors the industry has become enmeshed in a hopeless situation. Give the patient the treatment accorded a dying man, a shot of morphine so that he can reach the inevitable end with a minimum of pain.

A Probable Solution

Fortunately, there are ways and means of avoiding the situation just described. It may be done as follows:

1. Utilize by-products in such a way that the profit from their sale will improve cost of production.
2. Change the method of manufacture to such an extent that economy in one phase of manufacture can offset the increased costs in another.

The first method should be thoroughly explored, especially when there is considerable waste in manufacture. For example, in the production of lumber only about ⅓ of the tree reaches a market. The other ⅔ is thrown away or at best used for boiler fuel. Obviously, if this waste can be sold for a profit, the cost of lumber can be reduced and a certain proportion of these reduced costs can be divided between the producer and consumer. This is the reason why the Timber Engineering Co. is now engaged in trying to establish a wood sugar industry. It is exactly the same principle on which the meat packers operate when they advertise that they save everything except the "squeal." The lumbermen should go even further by saving the "bark."

But getting back to desks, it will of course be vastly helpful if the lumber industry through utilizing waste products can reduce the price of lumber. However, that is a meager hope and an indirect approach to the solution. It is a solution which will take more time than can be afforded if many of the principal markets are to be retained. Therefore, method number two should be studied.

Probably one of the most expensive factors in manufacturing desks or other furniture is the cost of finishing. If a major portion of cost of finishing or even a part of it could be eliminated, the producer would come pretty close to finding a method whereby he could economically treat the wood to give it added qualities of hardness, dimensional stability, fire resistance, etc. Supposing that through this same treatment the producer could color the wood and then by pressing obtain a sheen finish that is equivalent in appearance to the conventional type finish. If this can be accomplished on a commercial scale, we will have surmounted one of the major obstacles in retaining a valuable market.

Wood Products and Production Line

Unfortunately, wood products manufacture has in general not been a straight line, rapid process. Metal objects, dishes, automotive paneling, toys, furniture and caskets, are stamped out of a sheet of steel with one stroke of the press, but a wooden article for similar utility goes through a much slower and more costly process. In many lines of manufacture we must in one way or another overcome this handicap. In some instances this may not be too difficult. For example, a large toy manufacturer was recently faced with a shortage of steel which he needed for wheels for small wagons and kiddy cars. Because of the shortage of metals he was forced to manufacture wood wheels but to produce a wood wheel in the conventional way required sawing, turning and finishing. Even so the wheels were not particularly satisfactory. Changes in dimension because of variable moisture content conditions caused the wheel to be oval and because it was economical to use a soft textured wood the wheels when put into use deteriorated rapidly because of abrasions and splitting. Through new systems of impregnating, this toy manufacturer was able to obtain help. He is now

Today, Lo-"K", the superior flame-proofed cotton insulation, is available to dealers and consumers.

Of course, it takes more than the availability of a product to make a sale. There has to be a market.

But, here again, the Lo-"K" dealer is on top. Remodeling is on the increase, and post war building is just ahead. And insulation is a "must" in remodeling or new construction. No building is complete without it. This, then, is the market for Lo-"K"...*today's market!*

With remodeling at peak levels...and the demand for insulation increasing daily, you can begin making money right away with Lo-"K". No waiting for postwar markets...you can get all Lo-"K" you need right now!

Send in the coupon for the complete Lo-"K" Sales Plan—an assured profit maker for you. No cost or obligation.

FLAME-PROOFED Lo-"K" COTTON INSULATION

DON'T FORGET

Uncle Sam is urging everyone to insulate, too!

Lockport Cotton Batting Company, Dept., AL-12
Lockport, New York

Gentlemen: Please send me samples and complete information about Lo-"K" Cotton Insulation.

☐ CONTRACTOR or BUILDER ☐ DEALER
☐ ARCHITECT

Name.....
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City..... Zone..... State.....

Season's Greetings
Babcock
LUMBER CO.
As our Company celebrates its 57th Yuletide Season may we take this opportunity to extend our customers and friends everywhere our heartiest wishes for
A Merry Christmas
WITH — Deep appreciation to our SOURCES OF SUPPLY for their outstanding manner in overcoming unprecedented difficulties to meet war-time demands
AND WITH—Gratitude to our CUSTOMERS for their patience and tolerance in these trying days when restrictions and shortages seriously handicap our ability to please
WHEN—Victory comes and the Peace brings Prosperity, we will be prepared to meet its increased demands with ability and capacity to supply Yellow Pine, West Coast Products, Appalachian and Southern Hardwoods of the highest quality obtainable.
PLANTS
Babcock Lumber Co., Angier, North Carolina.
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Babcock Florida Co., Punta Gorda, Florida.
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Pride in the past — —
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MANUFACTURERS & WHOLESALERS
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installing some new equipment which will not only put his wheel business on a production basis but will provide a better wheel at lower cost. The new system will be somewhat as follows:

Blanks of wood from which the disks are to be made will be impregnated with a low cost colored resin. Disks will then be cut out of the blanks with a disk saw just like mother cut doughnuts with a doughnut cutter. They will then be put into molds in a hot plate press and stamped into the desired shape. This has been made possible because the resin impregnated into the piece gives the wood plasticity, permitting it to be shaped under pressure and heat conditions. The manufacturer through this process, if successful, will have accomplished several things.

1. A slow expensive turning, sawing and sanding operation will have been made over into a straight line, rapid production system where the work will be done in a fraction of the time previously required.

2. By means of the system, color and a high polish finish will be obtained at small expense.

3. A product will be produced that will have relative dimensional stability under severe use conditions.

4. Wearing qualities will be improved.

5. The general appearance will be much better because a new and more desirable design can be used without adding too much to the cost.

Research Program for the Future

There are literally dozens of organizations anxious to undertake research for the lumber industry but with few exceptions these organizations require two things:

1. Money to conduct the work.

2. Direction in the type of research needed.

Some of them are competent, well managed and capable in every way to undertake programs for the industry. They should be encouraged to the fullest extent.

In regard to the two requirements which these organizations need to get them to work, the first, i.e., obtaining the money, is probably the least difficult. There are all sorts of ways for doing it and these methods are well known by the industry. The second condition is more difficult to handle for the following reasons:

1. Most research organizations are not acquainted with the lumber industry's problems and are incapable of recommending what should be done. For this information they must necessarily depend upon their sponsors to not only furnish the funds but to tell them what to do.

2. Many of the potential sponsors, though well informed and perhaps capable of directing a research program, are so busy with affairs of business management that they cannot afford to take on this extra responsibility.

3. In those instances where neither the sponsor nor the research organization is able to take on the responsibility of directing a program, the background and facilities for coordinating the research are apt to be lacking. Without such coordination there will inevitably be a large amount of duplication and therefore a waste of funds.

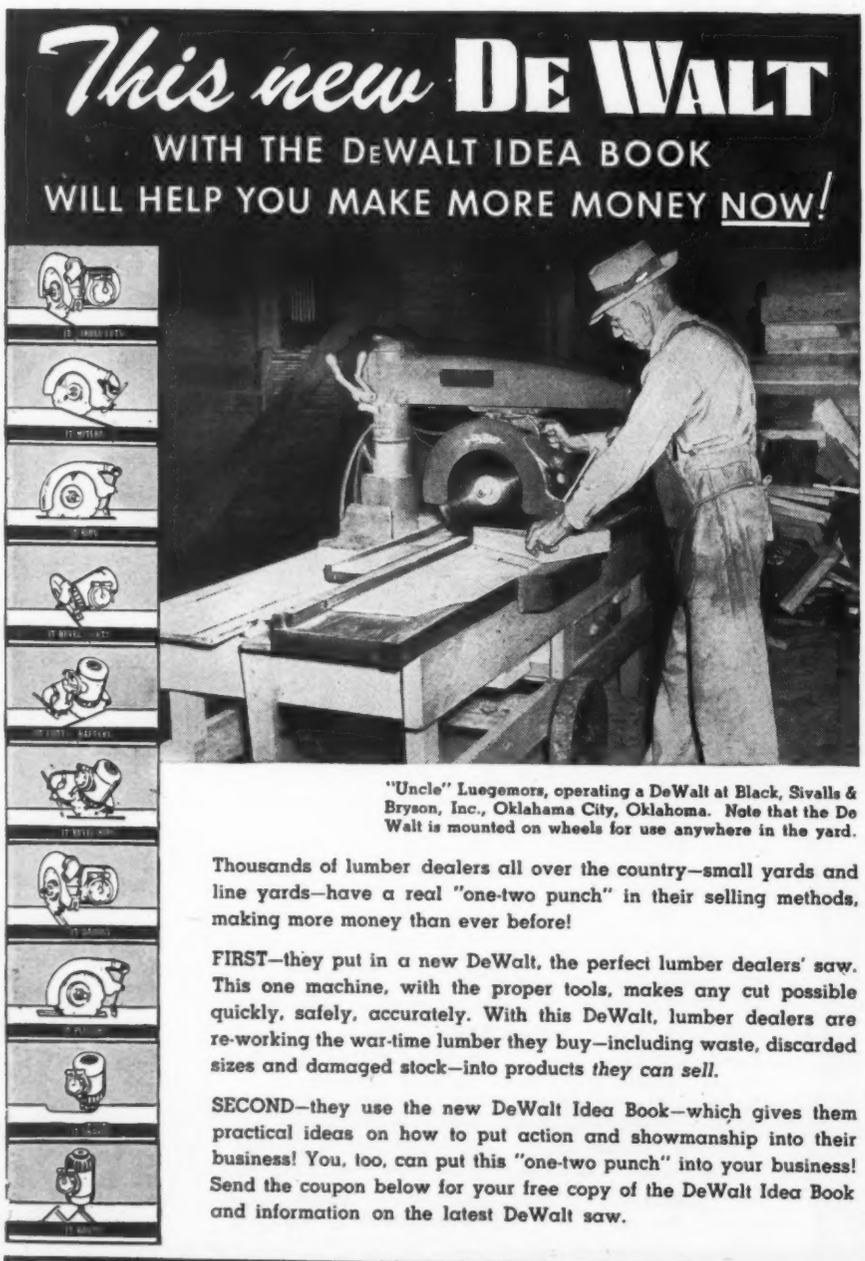
A Research Program

An outline that mentioned all the needed investigations in the field of wood research would require a volume of more length than permitted here. We can, however, consider a basic program to which the details can be added as needed. In general, wood research may be broken down into two classes.

1. Improvement in lumber and lumber products.
2. Utilization of wastes in the woods and at the mill.

The first would be calculated to improve the quality and utility of lum-

(*Continued on Page 74*)



"Uncle" Luegemors, operating a DeWalt at Black, Sivalls & Bryson, Inc., Oklahoma City, Oklahoma. Note that the De Walt is mounted on wheels for use anywhere in the yard.

Thousands of lumber dealers all over the country—small yards and line yards—have a real "one-two punch" in their selling methods, making more money than ever before!

FIRST—they put in a new DeWalt, the perfect lumber dealers' saw. This one machine, with the proper tools, makes any cut possible quickly, safely, accurately. With this DeWalt, lumber dealers are re-working the war-time lumber they buy—including waste, discarded sizes and damaged stock—into products *they can sell.*

SECOND—they use the new DeWalt Idea Book—which gives them practical ideas on how to put action and showmanship into their business! You, too, can put this "one-two punch" into your business! Send the coupon below for your free copy of the DeWalt Idea Book and information on the latest DeWalt saw.

DeWALT PRODUCTS CORPORATION
5300 Fountain Avenue, Lancaster, Pa.

☐ Send me a free copy of your DeWalt Idea Book.
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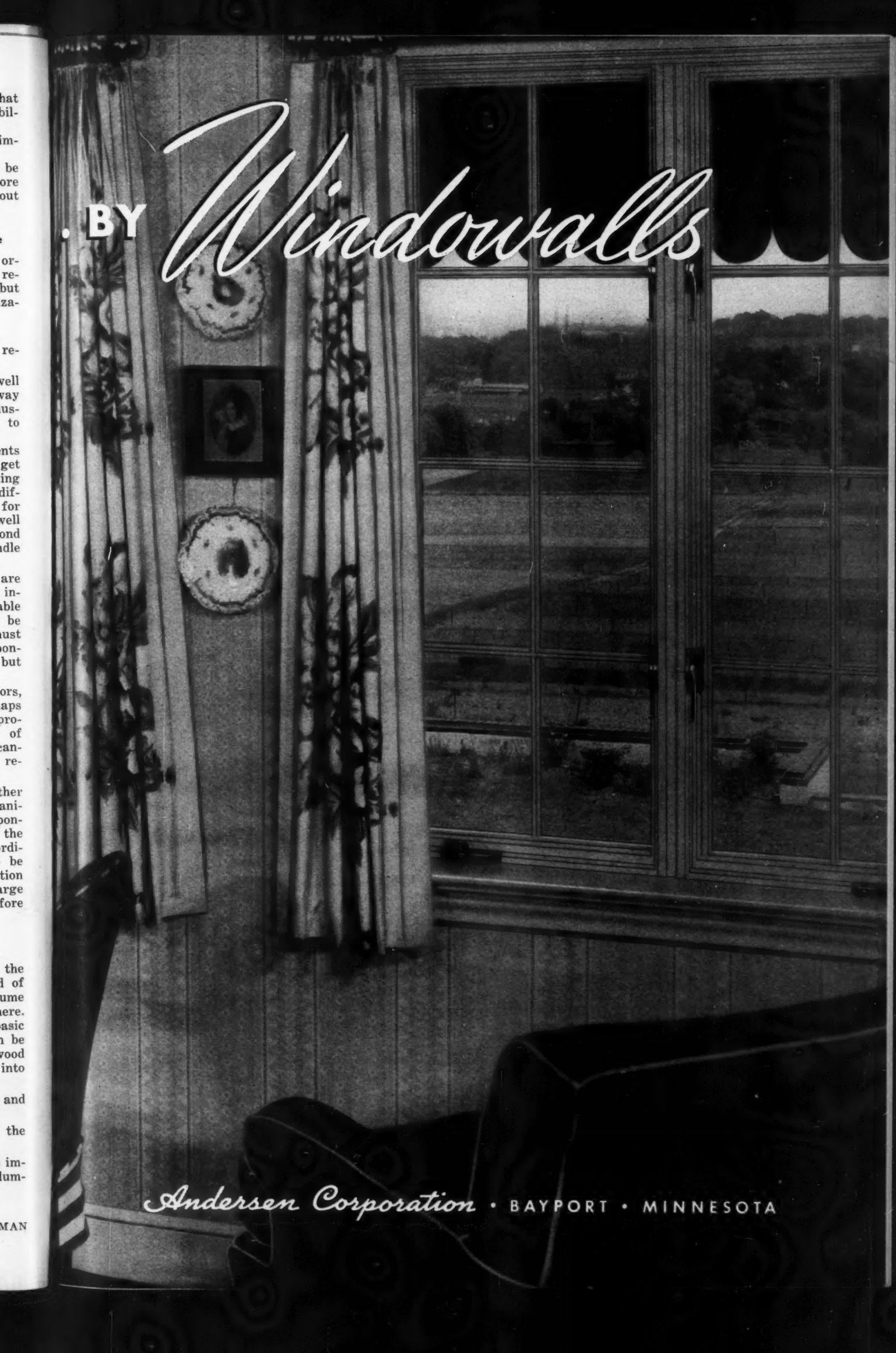
BY Windowalls
Andersen Corporation • BAYPORT • MINNESOTA

Research Builds Markets

(*Continued from page 70*)

ber and lumber products of the kind usual to sawmills and wood products operations. The research necessary to do this would be expected to develop new products and new markets.

In most instances, regardless of the amount of effort expended to decrease the cost of such processes, it would probably be found that in general the improved products would be more expensive than wood in its natural state.

The second field of research or utilization of woods and mill wastes, if successful, would have as its objective:

a. The profitable use of a greater proportion of the tree or log.

b. Reduction in the cost of lumber and lumber products.

If, for example, we can obtain a profitable by-product from woods waste, the overall cost of logging chargeable to lumber may be reduced and the markets for the products extended. Recovery of mill waste for usable and salable products would tend to reduce the cost of raw materials for the major lumber and timber products.

The following general outline for the two groups probably sums up the type of research that should be undertaken by the lumber industry.

Group 1

Under Group 1 the factors which are wrong with lumber or lumber products should be given first attention. These in the order of their importance would probably be somewhat as follows:

1. To devise a method whereby relative dimensional stability can be obtained economically. Of all the difficulties in handling wood, probably the inherent characteristic of the material to shrink, swell, warp and distort is more discouraging to the user than any other factor and therefore more encouraging to competitors seeking to replace lumber markets.
2. To obtain better and more uniform quality in the properties of wood, including strength. Wood to compete with plastics must be made more uniform in quality. It must have other properties which will allow it to be worked and handled as successfully as plastics. To compete with the lighter metals for many purposes, it must have certain increased strength requirements.
3. Fire resistance. Fire resistant properties for wood, ranging from the high priced field to the low priced, rank only slightly less important.
4. Decay resistance. This is less important than the other fields cited but is a factor in determining the use of wood for many purposes.

To obtain the greatest value from moderate expenditure in this field, applied research probably offers larger opportunity now than more fundamental research. For example, in the files of the Forest Products Laboratory is a wealth of fundamental research awaiting practical application.

Group 2

The order of importance under Group 2 would probably be something like this:

1. Hydrolysis of wood wastes.
2. Distillation of wood.
3. The use of wood sawdust or wood flour for molding powders, polishing materials, or other places where mechanically ground wood could be used.
4. The development of wood for fuels.

Hydrolysis of wood is listed as the most important, for at the present time at least it is probably recognized as being the foremost field for breaking down wood and obtaining valuable products therefrom and is probably the predominant field in which the largest quantities of mill wastes and eventually woods wastes may be utilized.

"CUTS EVERYTHING FROM BLUE GRASS TO A 30" OAK"

— says Missouri Lumberman

—and that's a typical production record of the Lowther C-Saw! Large timber operators say—"It enables one man to do the work of 3". Single independent loggers say—"It triples my former production". Whether the job is felling or clearing—whether hardwood or pulp—the Lowther C-Saw is producing for timber operators in these days of scarce labor and pressing war production. Find out about it. Mail coupon below for descriptive circular.

HARRY A. LOWTHER COMPANY, 141 W. JACKSON BLVD., CHICAGO 4, ILLINOIS

Send me circular 50 that shows me how to triple my output.

Name_____

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The health, comfort and convenience of our employees and their families were given every consideration in the construction of our modern logging camp with its cool, fresh lawns in summer, its warm snug homes in winter.

No. 17 in a series on modern lumber manufacturing.

At this season of the year when the word "home" is even more important than usual, we pause once again as we have for nearly 50 years, to wish each and every one of you the Season's Greetings.

A Merry Christmas and a Happy New Year

J. NEILS LUMBER COMPANY

Klickitat, Washington **Libby, Montana**

(Continued from page 39)

buildings will require 3,107,307,000 b. f. of lumber.

In addition to the workshop and machine storage warehouse, nine percent of farmers plan to build garages for the family car. This is one building that most of them indicate they would like to buy ready built from the local lumber yard at a fixed price.

Corn belt farmers need new corn cribs. Fourteen percent of these farmers plan to build at least one crib. These farmers are almost unanimous in their desire for a double crib that has a concrete floor and adequate rat proofing. The corn belt area produces much of our commercial pork, but during the war hog raisers have apparently satisfied most of their new construction needs; only one-half of one percent of them plan to add new facilities during the five years after the war. New hog house construction will therefore have to be a generated business. If a building can be developed that will house the corn as well as the hogs, and provide feeding facilities that will save enough labor to make present buildings a poor investment, a boom can be expected in hog houses, too. And to hear some responsible agricultural engineers discuss this problem, one would believe that this type of structure is in the cards.

The poultry buildings of our nation are generally out of date. Surveys point out that 57 to 70 percent of them are in poor condition. This is only natural as most of them were makeshifts to begin with. The bankruptcy rate in commercial poultry enterprises ten years before the war may have accounted for this condition and the fact that on most farms the flock was a side line with the women. Poultry and egg prices during the war have shown farmers that poultry can be a profitable part of the overall farm operation, but to make money from poultry, one had to have adequate housing for the flocks. Perhaps that is why 16 percent of all farmers plan to provide some type of new house. The trend seems to be principally toward brooder houses that can be converted into laying houses as the chicks grow.

Just as the city yard and the industry are looking to the large volume of new house construction that is indicated for after the war, country yards can look to this house market. Modern farmers realize that a comfortable house is just as essential as any other building on the farm. Farmers today want a bath room, central heat and a well planned modern house. For years they have struggled without conveniences, but today when they have money they are determined to bring the house up to date. They want to give their wives the comforts enjoyed by city folks and they realize that a modern home is essential if the children are to be kept on the soil.

Fourteen percent of farm families plan to build a new house after the war; this means 444,866 homes on owner operated farms. These new houses will not resemble their 1880 predecessors, for farm women have definite ideas about their new homes. This house of the postwar era will be a low house, as 68 percent of them want a one-story home and 12 percent want a 1½-story unit. Forty percent of the homes will have 6 rooms, 27 percent 5 rooms and 14 percent 7 rooms. Forty-eight percent of these dwellings will have 3 bedrooms and 39 percent will have only two. Ninety percent of these farmers want a complete bath and 58 percent insist on central heat while 14 percent believe they can get along with the stove or unit heater. Seventy-two percent of these people want the sidewalls and roof insulated. These new homes will not be built of the stuff that dreams are made of. These farm women want regular paintable wood siding by an overwhelming majority and they are divided almost 50-50 between wood shingles and composition shingles for the roof.

In the kitchen they want continuous top counters with cabinets below and above. Fifty-three percent of these women want wooden cabinets and 35

A Good Dinner for a Termite

Treat the Ground and Wood

Your customers (farmers—home owners) can lick their termite troubles. Or it might be carpenter ants, lyctus or powder post beetles or just plain rot. But they can kill or prevent these wood destroying evils—at little cost and save many dollars worth of property.

CLEAR TOXIC
WOODHEALTH
PRESERVATIVE
★ ★ ★

A new CLEAR, TOXIC PRESERVATIVE in a beautiful package that will attract instantly a large percentage of any dealer's trade. WOODHEALTH is colorless and does not affect painting at all. Anyone can use it—complete directions on label.

It's ideal for all wood products from FENCE POSTS and HOG PENS to PORCHES and TIMBERS.

Made by the manufacturers of
WOODLIFE TOXIC
WATER REPELLENT PRESERVATIVE

Protection Products Mfg. Co.
Mfrs. of PRESERVATIVE SOLUTIONS for 23 Years
Research Laboratory and Plant KALAMAZOO, MICH.

percent want steel. White is the favorite color of 64 percent and ivory is the alternate choice.

Farmers expect to spend up to $4,500 for these new compact houses.

In addition to new housing for the owners' families, 7 percent of our farm owners intend to build separate houses for a farm hand and his family. This will add 258,943 units to the farm house total. These houses will be small and compact. Forty-two percent of them will have only four rooms and 33 percent will have five. Two bedrooms will be standard in 76 percent of them. Built-in double-deck bunks, closets and dressers will be standard in most of them.

All the surveys we have seen agree that the new construction market on the farm will be from three to five times as good as it has ever been but the remodeling market will be two to three times the size of the construction market. Just to select a few random types of remodeling planned;

73.4 percent of the farmers report that they plan an addition to at least one building;

47 percent will lay new floors, 63 percent of these will be wood

58 percent will change wall or partitions in at least one building

59 percent will install new doors or windows

41.6 percent will reside, 67 percent of these plan to use wood

It is one thing to know what farmers plan to do and another to know how many farmers really have budgeted money for postwar construction. Surveys indicate that 58 percent of all farmers have set aside funds for construction and 79 percent of it is in war bonds!!

News

(*Continued from page 9*)

Belo case, under which the stackers were to be paid on an agreed hourly basis of 35 cents per hour with time and a half for overtime, and with the agreement on the part of the company to pay the stackers in addition to the hourly rate a further sum based on a piece rate basis.

Amendment to Douglas Fir Plywood Price Regulations

Amendment No. 3 to RMPR No. 13—Douglas Fir Plywood—effective Dec. 4, was issued by OPA to expedite filling of military production orders. Permits producers of Douglas fir plywood who have submitted proposed prices to OPA for "specific" approval to quote such prices, make deliveries of the items, and, under specified conditions, receive payment at the requested prices pending approval or disapproval of the applications by the price agency.

Adds Star to Production Award

I. F. Laucks, Inc., Seattle, Wash., manufacturing chemists, now have a third star for their Army-Navy "E" flag.

Holiday Greetings

from

Gray Lumber & Shingle Co.

Established 1919

INDIVIDUAL RIGHTS:—

"All political power is inherent in the people, and governments derive their just powers from the consent of the governed, and are established to protect and maintain individual rights."

"A frequent recurrence of fundamental principles is essential to the security of individual rights, and the perpetuity of free government."

Article 1, Sec. 1 and 32, Constitution of the State of Washington.

GRAY LUMBER & SHINGLE CO.

Cecil V. Gray, Owner

Henry Building

P. O. Box 812 **SEATTLE 11, WASH.**

Wishing you—
and yours and ours
Beyond the Seas—
THE BEST for 1945!

"The Summit of Service"

ÆTNA-PLYWOOD & VENEER

ARMitage 7100—Teletype CG 305
1731 ELSTON AVE., CHICAGO 22, ILL.

Griswold

PACIFIC COAST
LUMBER PRODUCTS

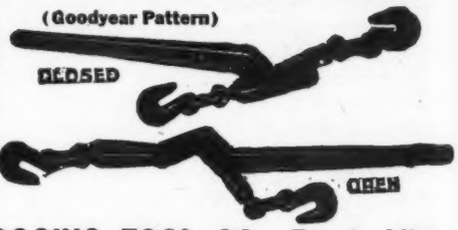
Yard Stocks, Long Joists, Long Dimension, Plank, Timbers, Ties. MIXED CARS. Dependable values. Your orders will receive prompt, careful attention. Write us about your needs.

THE GRISWOLD LUMBER CO.
FAILING BLDG. PORTLAND, ORE.

American ALL STEEL Double Swivel Load Binder

For binding LUMBER, LOGS. Holds load firmly. Strongest . . . forged steel throughout . . . easiest to use . . . most practical and effective. Three sizes. Write for circular and full information.

"American" line of Logging Tools and Appliances is the best on the market. Catalog on request.



AMERICAN LOGGING TOOL CO., Evart, Mich.

KNIGHT

Single, Duplex and Quarter DOGS
Saw Mills, Set Works, Edgers

Manufactured by

THE KENT MACHINE CO.
117 Portage St. Cuyahoga Falls, Ohio

SPOT CORD

REG. U.S. PAT. OFF.

—the most durable material for hanging windows

SAMSON CORDAGE WORKS
BOSTON 10, MASS.

More New Fence

As the nation's soil fertility must be maintained through proper crop-and-livestock rotations, the government continues to release fairly large amounts of steel for woven wire fence.

Keystone's present fence, while not marked with Red Brand, is the very best fence obtainable under present government restrictions.

Because of 53 Years Satisfaction Fence Users will continue to *"Look for the Top Wire Painted RED"*

KEYSTONE STEEL & WIRE CO.
PEORIA 7, ILLINOIS

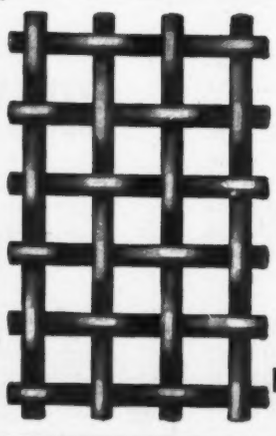
RED BRAND FENCE

CHENEY METAL CORRUGATED ROOFING

The Permanent Successor to the old-fashioned corrugated iron roof

Now Available DISTRIBUTORS WRITE US!

CHENEY METAL PRODUCTS CO., Trenton 5, New Jersey

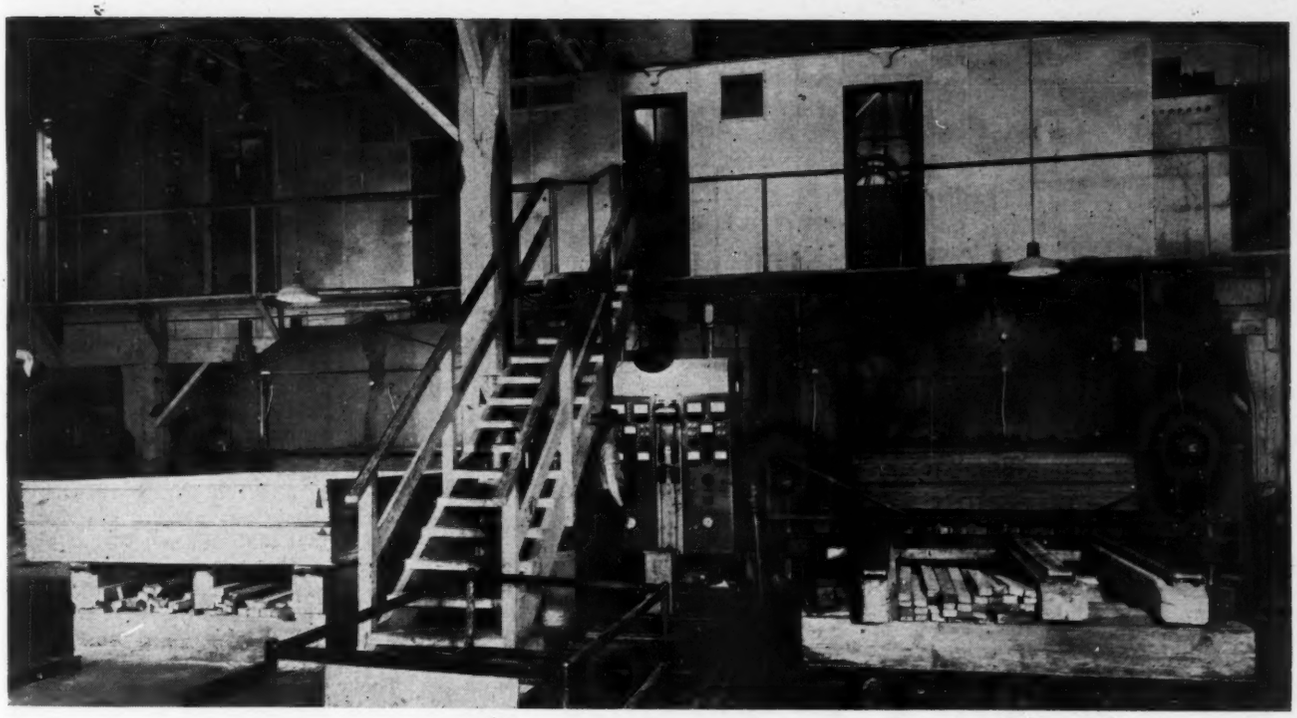


WIRE CLOTH

Heavy Wire Cloth
For All Purposes
Steel, Brass, Copper, etc.

Also Window Guards, Screw Door Guards and Other Heavy Woven Wire Products

Kentucky Metal Products Co.
Louisville 4 Ky.



High frequency dielectric equipment in the West Coast plywood plant is housed above the presses in a metal enclosed chamber 54 feet long, 14 feet wide and eight feet high. Capacity of the equipment is 600 K.V., and the high frequency is on the order of 2,000,000 cycles.

High Frequency Heat Opens New Markets

(*Continued from Page* 49)

inches long was dried from 16 percent moisture to less than five percent moisture content in one hour and 15 minutes.

Much of the early work was successful, but most of it was not advanced at that time because of the restrictions imposed by the war. While high frequency lumber drying appeared successful in the laboratory it was found that considerable work remained to be done in order to obtain the optimum drying rate. This new means of applying heat was so rapid and so uniform throughout the mass that an entirely new set of problems arose. It was possible to generate the heat in the middle of a mass as easily as near the outside, but if the heat was applied until the free moisture reached something over 212 degrees F, it would vaporize and build up internal pressures.

At that point the heat added needed to be held down to a rate that would not cause these internal pressures to accumulate and increase to a destructive value. The rate of dispersion of the steam through the wood depended upon the density of the wood, the cell structure and other factors.

The speed of drying is therefore dependent not only on heating the wood uniformly, but also on the rate at which the moisture travels through the cell structure of the wood. Most conventional wood drying is done in thin sections. Heat can easily be conducted through such thin sections and the moisture can readily get to the surface.

High frequency dielectric equipment is able to generate heat as readily in thin as in thick sections, but the comparative benefits for drying are greater as the thickness increases.

The problems involved in the manufacture of plywood, while similar in some respects to lumber drying, differ in other important respects. The inherent limitation of slow moisture transmission through wood cells, that is involved when fast drying is attempted, is not present in plywood bonding. Further, in setting the plywood bond the panels can be stacked to a height of one or two feet and the high frequency power will generate heat throughout this thickness of material quickly and uniformly. Such loading fully utilizes the high frequency dielectric ability to generate the heat within the material. On such thick loads radiation losses are reduced substantially, as there is so little surface in contact with the air or other radiating surface, considering the volume of the load.

It was most natural therefore, that the researchers in their early work turned to the field of wood bonding. This ranged from large plywood operations to curing the adhesive in pencil slats.

The interest shown by plywood operators resulted in the first large installation of high frequency dielectric heating. This installation was in a West Coast Douglas fir plywood mill. The large high frequency equipment furnished power to two presses, one producing 4x10-foot finished panels and the second producing 4x8-foot finished panels. The high frequency power for each press is regulated very simply, by easy to operate control panels. The capacity available in the high frequency equipment is sufficient to permit operation of both presses simultaneously.

Improvements were made in closing time of the existing presses, and conveyor systems of the roller type were installed so that the new higher production resulting from the high frequency installation could be adequately handled. Two spreaders and layup tables are a part of the production line for each press. One-half of a press load is laid up on a ½ or ¾-inch wooden caul. The other and upper half of the press load is laid up on the center electrode which is simply a wooden caul covered with copper sheet.

Each of these bundles weighs nearly 1,000 pounds, since the 50x126-inch panels (unfinished dimensions) are stacked to a height of 10 inches. Each stack is rolled on a branch feeder conveyor to the center conveyor. At this point an overhead crane picks up the stack that was laid up on the electrode-caul and places it on the other stack. The 20-inch high load is then rolled into the press. The high frequency slip-on connector is attached to the center electrode.

With a soya bean adhesive this bundle of plywood

can be brought up to curing temperature in 10 minutes. Sixty-four 5/16-inch panels, three-ply (finally sanded to ¼-inch) are included in the 20-inch high bundle that was pushed into the press and heated to a curing temperature in 10 minutes!

Blood glues are also used in production on this press and the time cycles are similar to those in use for the soya bean panels.

The second press is running phenolic bonded exterior grade 4x8-foot finished panels (unfinished 50x100-inch) in ½-inch plywood (9/16-inch before sanding). Each press load consists of 32 of these panels stacked one on another to a height of 18 inches as it goes into the press. The heating time is 18 minutes for this press load.

The high frequency electric equipment on this installation has been in almost continuous service for over 2½ years, and has accumulated the total of some 16,000 hours of operation.

What does high frequency dielectric heating have to offer in wood bonding? The ability to generate heat quickly and uniformly throughout the wood. The temperature of the plywood load can be raised quickly, and with temperatures at the center of the bundle increased as easily and as quickly as temperatures near the outer edges or near the upper or lower platens.

The large cauls can be eliminated because the pressure need be applied only while the load is in the press between the platens. The plywood is under pressure for such a short time that most of the ¾-inch cauls usually interspersed through the bundle can also be left out, as the short time cycle greatly reduces warping, wrinkling and waving.

With high frequency bonding the glue spread can generally be reduced by 25 to 40 percent of that required in cold pressing. Less moisture will then need to be removed. This results in increasing the effective and combined capacity of the veneer drier and re-drier, and materially reduces the drying costs per panel.

The fact that less moisture is placed back in the panels and the panels are "softened" by the heat during polymerization of the glue also contributes to the production of much flatter and more stabilized panels. The glue lines are thinner, which reduces the possibility of crazed joints. These thinner glue lines also offer less abrasive resistance to the saws used in the final cutting operations.

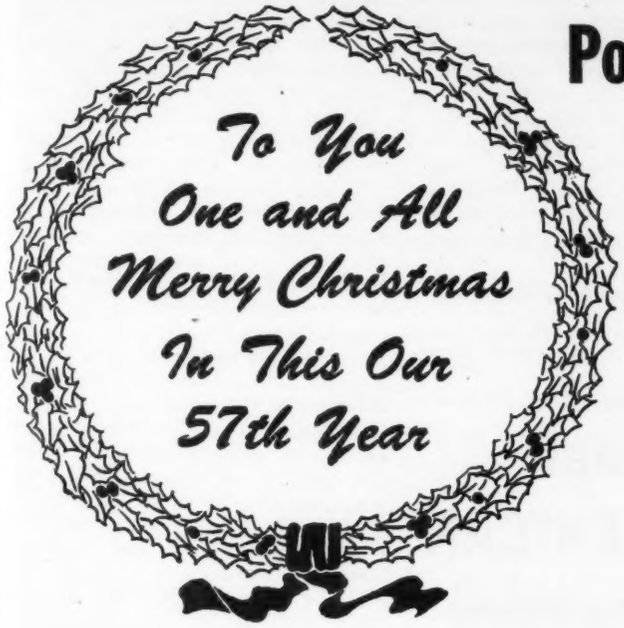
It is not at all uncommon according to the Thermex Division, to figure an installation and find that a high production dielectric unit can be paid for in one year out of savings from glue costs, labor costs, and re-drier costs, and produce equal savings for each year thereafter, along with improved quality and better products.

Laminated wood can probably expect great impetus from the remarkable heating ability of high frequency equipment, especially in lumber having a thickness of one inch or more, as in the dimension lumber field and similar work.

Laminated pieces made of white oak in varying thicknesses, ranging from one to two inches, can be spread and cured at one time, to total thicknesses of 6, 10 or 12 inches, as the specifications may require. Such a piece can be fully cured in five to 10 minutes with each glue line testing complete wood failure. The softening effect of the heat in the wood gives better surface contact between the thick adjacent members. The finished piece is of much more uniform strength than the solid piece. High frequency heat and new adhesives will team up to revive the framing lumber business, involving such pieces as rafters and other structural members. Here again all the benefits of heat generated evenly, and therefore in the center of the material at the same time as it is generated near the outer edges, gives a finished piece more free of strains.

Marked improvement in the utilization of lumber can be made by a sound, well-developed laminating program. Much more abundant and cheaper grades of lumber can be used to give finished pieces that will have great dependability and high minimum strength characteristics.

Season's Greetings
from Crowell
We will be manufacturing high quality
CALCASIEU LONG LEAF
Lumber & Timbers for many years to come.
This plant is equipped with heavy duty circular and band mills, modern fan-type dry kilns, a big planing mill, and everything needed to make, season and ship as fine lumber and timbers as ever came out of Louisiana.
We hope to supply the needs of our many retail friends (as soon as the war ends) just as we have done for more than fifty years.
CROWELL LONG LEAF
LUMBER COMPANY, INC.
LONG LEAF, LA.



Postwar "Sudden Service"

Angelina's "Sudden Service" of the past half-century has been interrupted by the demands of war these past few years. This has not been to our liking, but it has been necessary to divert all our efforts and capacity to the winning of the war.

But Peace and Victory are nearer, day by day, and it should not be long until we can again channel all our efforts and materials and 100% "Sudden Service" to your needs. Our postwar plans include a pledge to take care of your requirements just the moment restrictions are relaxed and well-seasoned, properly-manufactured Lumber and Lumber Products can be shipped to you.

Now Two Stars in the Angelina Army-Navy "E" Flag

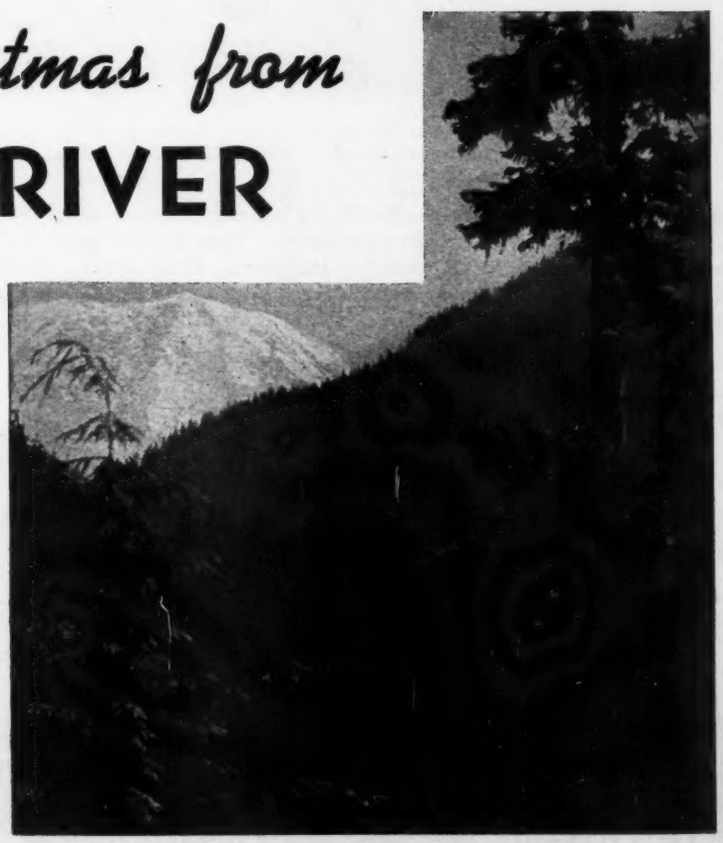
ANGELINA COUNTY LUMBER CO.

KELTYS, TEXAS

Telegraph Office: Lufkin, Texas

Merry Christmas from

WHITE RIVER



From the land of the great Douglas Firs and Hemlocks, White River Lumber Co. and its employes send you the best 1944 Yule greetings.

We hope that before this time next year Uncle Sam may permit us to turn at least a portion of the big White River mills' output to the service of old customers whose needs we have been unable to meet under war restrictions. Our sincere appreciation for past patronage.

White River Lumber Company

Enumclaw, Washington

(Since 1896)

Plastics

(*Continued from Page* 53)

resinous substances after isolation with other chemical compounds. Whether isolated or not, these materials possess thermosetting properties and are capable of being molded and fabricated by well-known standard techniques. The production of substances of this type from wood, wood waste and sawdust have been the subject of investigation for many years.

Lignin resins may be prepared in one or two ways. By one method, chemically modified lignin is isolated from the spent liquors resulting from the pulping of wood. Chemically combined lignin as present in waste liquor has little utility for the manufacture of plastics. It therefore becomes necessary to modify it further, by chemical treatment, to obtain a suitable product for plastic manufacture. Such material is being produced currently by the Marathon Chemical Co., and by the Mead Corp., although the products differ in their properties.

Using the Lignin While in the Wood

The second method of utilizing lignin for plastics is to convert it while still in the wood to a material having moldable characteristics. In so doing, the bond between the binder (lignin) and the filler (cellulose and hemicellulose) is loosened and activated. The product is a modified mixture of lignin, cellulose and those other materials which go to make up woody tissue. This is the basis of the Sherrard Process in America and the Losey Process in Russia. Both of these processes, however, depend upon the addition of other resin forming materials, such as phenol-formaldehyde to supplement those already existing in wood.

In the Benalite Process in this country, the Barkolait Process in Russia and the Lignostone Process in Germany attempts have been made to produce a molding compound without the addition of other resins. These processes have provided little of merit. More recently a process, that of The Dow Chemical Co., has provided a means of obtaining a moldable lignin plastic from wood without addition of other natural or synthetic resins. This utilizes whole wood or wood waste and is essentially in the first stage a pulping operation with sodium phenate. By proper control the first step may be stopped at a point where the reaction has effected only the lignin or it may be carried further with subsequent attack upon the cellulose and hemicelluloses. At the suitable point the reaction mixture is condensed with formaldehyde to form a solution of resin in which is suspended fibrous cellulose. If desired, the soluble resin may be precipitated on the remaining fiber and sheeted and dried in the usual fashion. This sheet may be directly molded. As an alternative, the soluble resin may be separated from the cellulose and precipitated from solution, filtered, washed and dried. A moldable powder is then obtained.

Lignin laminated products have found wide use in the electrical industry because of their high mechanical strength, excellent electrical properties (notably arc resistance) low moisture absorption and ease of fabrication. At present they are used as switchboards, terminal strips, insulating washers and pattern plates. Other uses include dies, cabinets, templates, foundry patterns and the like.

Lignin-phenolic resins are being used as extenders for urea formaldehyde and phenol formaldehyde resins. As such they find use in impregnating varnishes, molding resins and adhesives. Up to 50 percent of phenolic solids may be replaced by ligninphenolic resin without loss of properties. They are also being used in the manufacture of adhesives in combination with phenol-formaldehyde resins.

* * *

Other Resins from Wood

The hemicelluloses of wood like cellulose are also carbohydrate in nature. They are less stable chemically and as

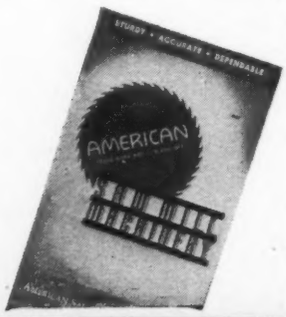
When the Going Gets Tough . . . You Can Depend on AMERICAN

An AMERICAN MILL Set up in the jungles of New Guinea — one of hundreds that are helping cut their way to victory in the Pacific Area.

MORE boards per manhour—that's the secret in four words of AMERICAN SAW MILL'S tremendous popularity. Year in and year out, through the toughest timbers, in all parts of the world, these sturdy, portable saw mills keep on cutting fast and accurately. They require little care or repair; last for a generation.

Increase your output in spite of present manpower shortage by installing AMERICAN mills for the war demand today and the building boom tomorrow.

NOTE: We make our own saws and parts — replacements quickly available in emergency.



Send today for this quick-reading, condensed catalog showing AMERICAN Mills (6 standard sizes) and other saw mill machinery. Send, too, for our catalog of modern design woodworking machinery.

AMERICAN SAW MILL MACHINERY CO.

Makers of Saw Mills, Edgers, Trimmers, Lumber Rolls, Shingle Machines, Swing Saws, Bolters and Accessories.

55 MAIN STREET HACKETTSTOWN, N. J.

Greetings

NINETEEN FORTY-FOUR'S Candle is burning low as we here at Miley . . . one of the South's outstanding lumber operations . . . pause to give thought to our many Friends and Customers and to wish all of you

A VERY MERRY CHRISTMAS

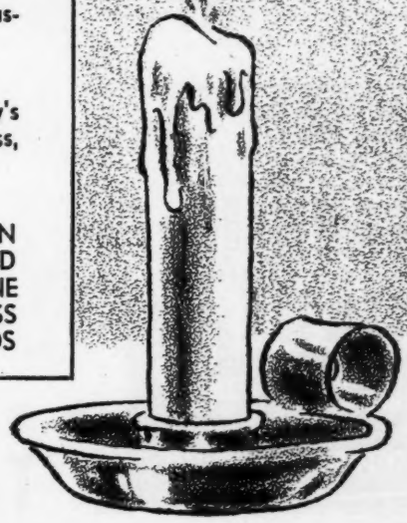
May your Holidays be as bright as possible under today's disappearing war clouds and may 1945 bring you every success, with a Final and Lasting Peace.

"WHERE QUALITY COUNTS, WE WIN"

80,000 FEET
DAILY CAPACITY
MOORE CROSS-
CIRCULATION
DRY KILNS

NOFMA CERTIFIED OAK FLOORS

BAND SAWN
SHORTLEAF AND
LONGLEAF PINE
CYPRESS
AND HARDWOODS



LIGHTSEY BROTHERS

MILEY, SOUTH CAROLINA

Members: Southern Pine Association • Southern Pine Inspection Bureau

ROSBORO *Douglas Fir*

CHRISTMAS GREETINGS

To Our Customers and Friends

The entire Rosboro organization joins in extending heartiest Christmas and New Year Wishes to lumbermen everywhere.

Before another Yuletide rolls around let us all hope that peace may be restored throughout the world and that needed home and farm building may be going forward on a broad scale over the land.

T. W. Rosborough, President. B. S. Cole, Secretary-Treasurer
W. E. Cooper, Vice-President. E. A. Carley, Sales Manager

Rosboro Lumber Company, Springfield, Ore.

a consequence they are unsuitable for direct conversion into plastics. It is possible, however, to convert these hemicelluloses into furfural. Phenol-furfural resins have been looked upon with favor for many years as alternatives to phenol-formaldehyde resins which, due to war production requirements, became as critical as metals during 1943.

Present furfural requirements are obtained from agricultural by-products such as oat hulls, corn cobs, rice hulls, cotton seed hulls, etc. Since the hardwoods, especially, contain large quantities of pentosans capable of conversion to furfural, the pulp and wood industries might well consider entering this field.

Rosin and similar resins found in the softwoods lend themselves to conversion into thermoplastic resins. The versatility of these resins has come to be appreciated only recently. By reaction with glycols they are most valuable for the manufacture of quick drying paints as well as for cements, paper coatings and cold molding compositions. Moldable resins can also be obtained by proper choice of reactant.

Wood substances and spent cooking liquors from the pulping process contain small quantities of fatty acids and sterols. Some recovery of these materials is made in the United States, and the product is sold under the name Tall Oil for use in paints and varnishes. This use of Tall Oil is, however, largely a war-time development and utilizes only a small proportion of the several hundred tons of material that are available. Further development might well be considered since the chemical nature of sterols and fatty acids is such that resins and plasticizers can be manufactured from them.

Rayon

The discussion would not be complete without at least a mention of synthetic fibers derived from cellulose—because of the magnitude of the industry and the consequent consumption of raw cellulose, principally taken from wood. There are two main types—those that are pure cellulose, and those which are cellulose derivatives. The process is the same in each case: the solution is forced through fine holes of a spinneret and coagulated into a thread.

Recent developments in rayon have been toward overcoming its loss of strength when wet. Latest wrinkle is to coat rayon yarns with a very fine coating of plastic solution.

Also of interest is the recent commercial production of laminated fabrics through the utilization of the thermoplastic properties of those yarns prepared from cellulose derivatives. The process is similar to that used for plywood. Layers of the fabric are brought together and fused under heat and pressure. End use at present is for collar fabrics, sweat bands for hats, and ribbons without selvage.

Future

What about the future? Four hundred and sixty-six research directors representing the country's leading producers and fabricators of all types of plastic materials predicted "marked growth" during the ten year period following the war. Greatest growth may be expected in the field of vinyl, styrene, acrylic phenolic resins and cellulose derivatives (other than cellulose nitrate) in the order named. In the field of cellulose derivatives, 94 percent of those who voted anticipated "growth." Sixty percent of this group indicated that "marked growth" was in prospect. Fifty percent of these research directors forecast "marked growth" for the field of lignin plastics; 39 percent felt that growth would be "doubtful." Only ten percent anticipated a "decline."

As for the synthetic fibers, **Textile World** (Sept. 1943), predicts that in the immediate postwar years synthetics will encroach greatly on the territory of natural fibers and that in the not too distant future will replace them altogether.

THIS DISPLAY SELLS GLUE FOR YOU

Nationally advertised, recognized quality, Franklin Liquid Hide Glue sells quickly . . . and repeats consistently. Favorite with homecraftsmen, carpenters, schools, hotel and hospital maintenance men.

IT'S THE GLUE FOR YOU, TOO FOR MILLWORK

A genuine hide glue that comes to you ready-to-use. No loss of strength or spread; no loss from souring or waste of unused mixtures; no chilled joints.

THE FRANKLIN GLUE CO., COLUMBUS 3, OHIO

FRANKLIN Liquid Hide GLUE

Greetings

from Colonial Cedar Co.

At this happy Yuletide Season we join in sending personal greetings to all old customers and friends.

While, until the war is won, Uncle Sam's needs will continue to have first call on our products, we're looking forward with Victory to serving you better than ever with our **FITITE** processed Cedar Shakes and Stayon Stained Shingles.

Colonial Cedar Co.
3510 Sixth Ave. West
Seattle, Wash.

Charles E. Putman **Ernest L. Connor**

Christmas Greetings

1891 — 1944

On this, our 53rd Christmas, we pause to send you, our friends and customers,

THE SEASON'S BEST WISHES

Long before another year rolls by, we sincerely pray and expect that wartime pressure will be relaxed, permitting us again the privilege of supplying your requirements of OZAN PINE

OZAN LUMBER CO.
Prescott, Arkansas

Modern Glues for Wood Lamination

(*Continued from Page 47*)

what might be termed "low cost, high temperature phenol resins" of relatively simple type, set in conventional hot-plate presses carrying a platen temperature of 260 to 300 degrees F. Such glues, with only minor changes in formulation, are well suited to the production of hardwood plywood for exterior use. Figure on half a cent per square foot extra for an exterior type bond and you open new doors, and plywood comes into its own.

Phenol-Resorcinol Resins

The most modern adhesives are those of the phenol-resorcinol, or resorcinol base, which have only come into use during the past one or two years. These glues have a "heat versus cost" rule. They are of phenol type chemically, the difference being that the substitution of low cost phenol with high cost resorcinol increases the cost. The rule is that the more phenol, the higher the setting temperature—so that one pays more for a lower setting temperature. But the versatility, the flexibility and convenience of use found in these combinations is remarkable. They have what can be called an "affinity" for wood. They are naturally gap-filling. They bond at low pressures. They are (provided temperatures are 70 degrees F. or higher) even more foolproof than casein glues. Now the complete durability of a typical 300 degrees pressed straight phenol resin can be obtained at room temperature of 70 to 75 degrees F. Further, these glues can be made to set at any temperature from 70 to 300 degrees F.

Through the use of glues such as these, wood constructions can be used anywhere, indoors or outside, under any conditions of exposure, above or below water, above or below the ground level, and the wider horizons for laminated wood and plywood can be explored. By no means is this future of wider use something fantastic, far in the future, yet to be attained.

If completely durable glues are to permit the use of laminated wood everywhere, inside and out, obviously fire-resistant and rot-preventive treatments must come into wider use. In the past these chemical treatments have frequently rendered wood ungluable. It is interesting to note that the chemical nature of new synthetic resin glues is such that their adhesiveness is not destroyed by these chemical treatments which give fire- and rot-resistance to wood.

Laminating utilizes small-sized timber advantageously. Small boards with minor defects can be used intact as inner plies. Serious defects can be cut out and the resulting short pieces used as the thickness and design of the laminated article permits; and short boards can be scarf jointed to make long ones. Now continuous, rapid machines are being developed expressly for this purpose, using resin glues that set fast under heat. Thus the making of short into long, and little into big, is a simple matter.

Already there is a big market for laminated wood—with indications that it will expand rapidly in the future.

One cannot touch on the farm market without mentioning the matter of bent laminated rafters for every kind of farm structure. It is one of the

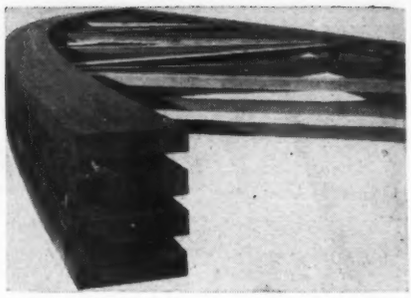


Photo: Timber Structures, Inc.

Giant four leaf truss with 140 foot span and glued laminated top and bottom chords. Fifteen laminae of six inch lumber in top and 10 in bottom chord. Top and bottom chords are kiln dried Douglas fir. Web members are West Coast hemlock of structural grade.

Merry Christmas

Producers and Shippers

LUMBER & PILING for 29 YEARS

Car and Cargo *Wholesale Only*

PATRICK LUMBER CO.

Terminal Sales Building, Portland, Oregon

Merry Christmas
from
Craig Mountain

May Santa Claus this year bring each and every one renewed vigor to press on to the day of Victory. In the meantime Craig Mountain will focus all possible effort on the box and crating needs of the Armed forces. With Peace our usual service will be restored as quickly as possible.

Craig Mountain Lumber Co.
Winchester, Idaho

NORTHERN HARDWOODS, SOFTWOODS
CAYUTA BRAND HARDWOOD FLOORING
MAHOGANY
WALNUT
SAWMILL CAPY. 25,000,000'
DRY KILN CAPY. 15,000,000'

COTTON & HANLON
ODESSA, N.Y.

We have been many years building up our reputation for quality and customer satisfaction. It distresses us that under current operating and supply conditions we are unable to meet even the needs of our regular customers. whose forbearance we solicit.

Postwar Prefabricators

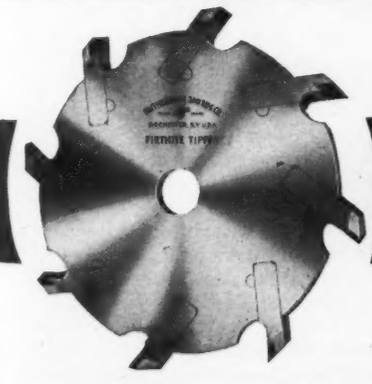
BEHIND the prefabricated homes and other structures manufactured by The Green Lumber Company are many years of success—many years of experience—many years of customer satisfaction.

OVER a quarter of a century ago our organization first engaged in the prefabrication of buildings for war use; later we developed and constructed countless structures for peace-time pursuits. With this background we were in excellent position to expand and speed up our manufacturing processes—and direct them along lines fitting into the war program. This we have done unreservedly for the past four years.

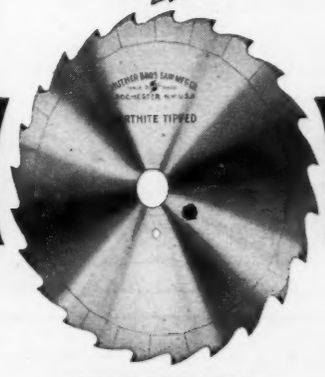
WITH the coming of peace we are prepared to quickly convert our manufacturing facilities from war to peace-time prefabrication, and to deliver to the home owner that satisfaction which comes from the possession of a properly designed and constructed building, something that can only be the product of a competent and experienced organization.

THE GREEN LUMBER COMPANY
LAUREL, MISSISSIPPI

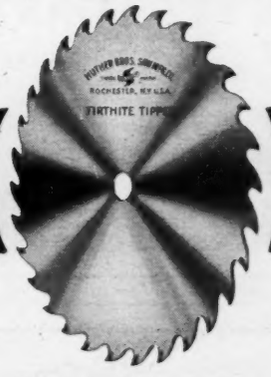
HUTHER BROS. SAW MFG. CO.



PATENT INSERTED TOOTH GROOVER
Firthite Tipped Inserts



FIRTHITE TIPPED SAW
Inserted Type, for Wood



FIRTHITE TIPPED SAW
Solid Type, for Wood

LONG-LIVED SAWS FOR LONG-RUN ECONOMY

Firthite Tipped Saws made by Huther Bros. Saw Mfg. Co. are made to stand hard service and are, therefore, long-lived Saws insuring long-run economy to the user. These saws are used for cutting hard Masonite, Teak, Fire-proof Lumber, Plywood, Linoleum, etc. Huther Bros. have long taken special pride in the quality of their manufacture, and the service and satisfaction all Huther Bros. saws give the customer.

Write for Huther Bros. Catalog No. 60

HUTHER BROS. SAW MFG. CO., Rochester, New York

W.T.SMITH LUMBER CO.
YELLOW PINE & HARDWOODS
Chapman ▼ Alabama

HOUSTON BLOW PIPE AND SHEET METAL WORKS
HOUSTON, TEXAS
37 Years' Experience
Engineering Service and Estimates Without Obligation -- Send Us Your Inquiry

best examples of partial pre-fabrication applied to the building field. The farmer buys the "bones" of his hog-house, implement shed or barn—bent, cut to size and drilled for connectors. Without highly skilled labor, the building is erected with speed and accuracy and economy. Tens of thousands of troop hutments built on this bent-rafter principle have housed our armed forces all over the vast scale of their present operation. Both casein and synthetic resin glues have given excellent service under a wide range of climatic conditions.

The agricultural implement field is already using laminated wood parts extensively. Wagon tongues and shafts and other heavy wood parts are made of wood and will continue to be so made because here is another of those many examples of the convenience of wood, the facility with which the size can be changed by the user, holes bored, attachments made.

The possibility of laminated railroad ties is quite interesting. Literally, we have cut vast forests and laid them on the road bed that carries the commerce of America. Every mile of single-track road bed requires, on the average, 3,000 ties which, multiplied by our total nationwide track mileage of 378,000 miles, gives us the astronomical figure of one billion one hundred million railroad ties.

One large eastern railroad claims it is necessary to replace the ties once in ten years, while the national rate of replacement is said to be one-half that — five percent replacements yearly. The ties are not replaced because they rot. A good job of preservative treatment is done before they are placed, but they wear, check

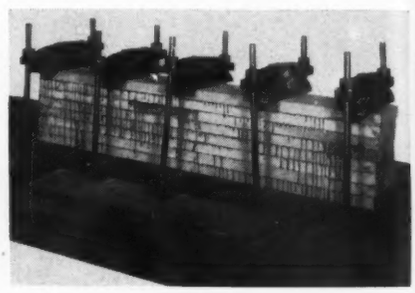


Photo: Gamble Bros., Inc.

Laminated dead wood of white oak.

and split and the spikes loosen. And of course, this checking and splitting is characteristic of most heavy-dimension solid lumber, and the only practical remedy is to use relatively small-dimension stock, season it properly and laminate it with modern glues.

Many other interesting possibilities are apparent when we transfer our sights to the field of veneer bonding, or plywood manufacture.

The light, waterproof plywood tube is what might be called a "war baby," developed for its lightness, strength and buoyancy, as a floating cable support for the navy. Several manufacturers are making these tubes, and they have interesting ideas for their post-war use, such as containers for concrete piling—split in half, as lightweight wood gutters—and for other purposes which fall between what might be called the natural fields of paper tubes on the one hand and metal tubes on the other.

Many boat manufacturers are already using laminated wood keels and frame members. Some of them are planning to go on from the point where the one-time solid members are provided in laminated form, by taking these finished laminations and embodying them into a mandrel or form the full size and shape of a hull, covering that framing with

DEPENDABILITY—we believe this characteristic is the base rock of sound business.

In the rush of work today the pattern of dependability remains strong and constant in ABESTO COLD PROCESS jobs —and the dealer who handles Abesto products is building a solid contractor trade and farm trade for tomorrow.

Write for our free specification sheets which show the various types of construction for which Abesto is used and give them to your contractors and customers.

Abesto Manufacturing Co., Michigan City, Indiana

SEND US YOUR INQUIRIES

WEST COAST and SOUTHERN Lumber and Box Shook

Graham Lumber Co.
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An Early Victory is Our Christmas Wish for You and a Peaceful, Prosperous New Year

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Season's Greetings

W. E. COOPER

Wholesale Lumber

606-608 Richfield Bldg., Los Angeles 13

51 YEARS
of Dependable Service

The Christmas Star Still Shines . . . .

and CROSBY SENDS YOU GREETINGS

It has been no pleasant task, here at Crosby's during these war days, to have to refuse your inquiries and return your orders. But we had a war job to do. Just as the Christmas Star still shines, Victory is getting closer. With the relaxation of restrictions, we will again be 100% at your command.

CROSBY LUMBER & MANUFACTURING CO.
CROSBY, MISSISSIPPI

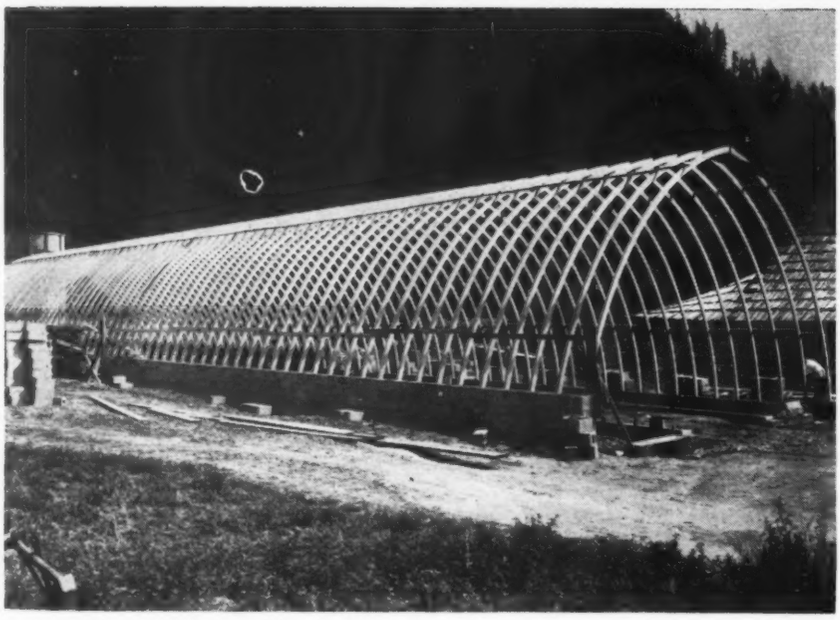


Photo: Timber Structures, Inc.

A cow barn 36 by 138 feet under construction on a farm near Issaquah, Wash. The rafters are made of laminated wood.

resin-coated veneers or thin lumber and welding the entire assembly into a finished boat hull by pressure and suitable heat which may range from 70 up to 300 degrees F.

Let us extend our thinking about boats to other more or less specialty things like station wagons, truck bodies and the small personal airplane. Surely the popularity of the station-wagon body proves that the public likes wood. And while we can agree that wood bodies will not compete with metal on a mass production basis, it is reasonable to figure that the items mentioned, including boats, probably will never be really mass-produced. The small airplane or the helicopter, with the constant changes which progress brings, will not, for a long time, justify a manufacturer setting up to stamp them out of metal. But they do lend themselves to laminating and molding techniques such as apply to the boat building already mentioned.

While we are here expressing our interest in and devotion to wood, let us not be blind to the interesting combinations made possible by the bonding of metal to wood. There are many such instances of desirable combined use; outdoor signs, truck bodies and store fronts. Modern adhesives make this possible by gluing the metal to the wood with a flexible bond which may consist of either natural or synthetic latex in combination with casein or certain forms of phenol-type resin. Bonds of high durability between metal and wood are obtained with simple gluing procedures carried out at room temperatures.

There is the gluing of wood to plastic, the bonding of wood to canvas to wood in boat bulkhead construction, the impregnating of thin wood sections with suitable resins and their subsequent bonding to similarly treated, or untreated, wood with pressure and heat whereby is formed a completely durable and finished wearing surface. To mention all of these developments is only to stimulate the mind to the possibilities of research.

Season's Greetings and Best Wishes for the New Year

The Meadow River Lumber Company

Rainelle, W. Va.

Young timber on old cutover land on Camino Tree Farm

CHRISTMAS

Yuletide Greetings to Lumber Friends Throughout the Land. May 1945 bring the Victory that all desire. Our sincere thanks to customers for their indulgence during this war time, when we have often been unable to make the shipments desired. With the end of the war it is planned that full Camino service will be restored.

MEMBER WESTERN PINE ASSOCIATION

Michigan - California Lumber Company

CAMINO, CALIFORNIA

Quality CAMINO SUGAR PINE

MILLER BROTHERS COMPANY, INC.

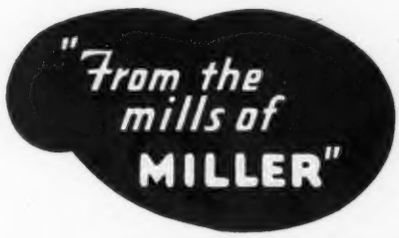
Johnson City - - - - Tennessee

Since Pearl Harbor our plants have been busy manufacturing truck bodies for Army Ordnance to be used by G. I. Joe and his Buddies.

Like you, we are looking forward to the day when our Victorious Fighting Forces complete their missions and return to us. We all can then get back to peace time work.

IT WON'T BE LONG NOW.

WE WILL BE READY with increased production and better products.



Appalachian Hardwood Flooring, Interior Trim, Treads, Dimension, etc.

Mills: Knoxville, Tenn.—Johnson City, Tenn.

Until Christmas, 194V

Our most sincere wishes for Christmas this year may not suffice to bring every personal happiness to you, our friends and customers, nor make each family fireside joyous with the return of your loved ones . . .

But *wishing and working* throughout the New Year will bring ever nearer the happiest Christmas of all, when total Victory is won and Peace is secure all over the world . . .

So this is our Christmas wish to you, and to the families of the four hundred Dierks employees now in the service of the Nation . . .

May 1945 truly be 194V!

DIERKS LUMBER & COAL COMPANY
Dierks Building **Kansas City, Missouri**

D-44

SIMS LUMBER CO.

SELMA, ALABAMA

Manufacturers of

SOUTHERN YELLOW PINE

K.D. FINISH
No. 1 & 2 DIM.
No. 1 & 2 BDS.
MOULDINGS

SERVICE

LONGLEAF
SHORTLEAF
BAND RESAW
HARDWOOD

QUALITY

162

We Wish You a Merry Christmas and a Prosperous New Year

Geo. J. Silbernagel

WHOLESALE DISTRIBUTOR

of

West Coast Lumber

and

Lumber Products

SPECIALIZING IN

PONDEROSA PINE

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WEST COAST OFFICE
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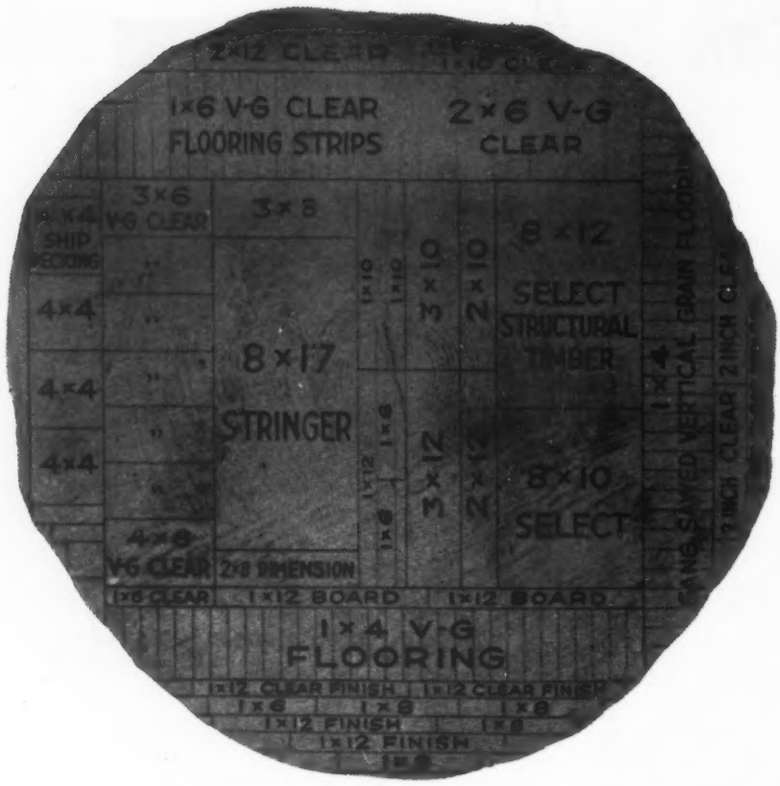

Wood Waste Utilization

(*Continued from Page* 55)

large measure to unsatisfactory experiences with sawdust where batches of hides have discolored and spoiled because of an unsuitable sawdust type.

Another example of the necessity of knowing the consumer's needs is found in the manufacture of composition flooring. A contractor may specify maple sawdust, for example, and the producer, not knowing what it is to be used for or thinking that the buyer cannot tell the difference, may ship the maple dust in mixture with oak or some other species. The oak will cause an unfavorable chemical reaction or, if some other species, an undesirable color may be imparted which will come through the flooring and spoil its appearance. The contractor will abandon the use of sawdust and turn to asbestos, ground cork, or some other material which, though it may be more expensive, will be one on which he can depend.

At present, there is a severe shortage of bark free and dry sawdust suitable for wood flour manufacture and thus prices for such materials have soared to unprecedented levels in the Northeast.

Where Do We Use Sawdust

On account of its absorbing capacity, sawdust lends itself to many uses in which this property is essential. It is used in meat-packing houses as an absorbent and in tanning establishments and other plants of a similar nature. When used as an absorbent its degree of efficiency is, in large measure, in direct relation to its dryness. Where sawdust and wood shavings are obtainable close by they are often used to a limited extent in nursery practice.

In the production of small metal objects, cutlery, wire novelties, turned in lathes and similar products, the items very frequently become covered with oil or grease. Before they are packed for shipment they must be cleaned, and this is usually accomplished by dipping them in some solvent and then drying them in sawdust. The parts are frequently revolved, together with the sawdust, in a large drum which absorbs the solvent solution and polishes the pieces at the same time. This use requires a dry, finely screened neutral sawdust that is free from large quantities of resin. Sawdust is also used in the cleaning of aluminum cooking utensils, tubing, and sheets.

Another use for sawdust is in the fur trade in the conditioning of pelts. Maple sawdust seems to be in greatest demand, although oak and other kinds are also used. In the packing and shipping of fruit, sawdust is used extensively. In Europe, sawdust is used quite extensively for home insulation and its use has interesting possibilities.

Research in the cement industry has conclusively demonstrated that rapid drying seriously impairs the strength and efficiency of freshly poured concrete. A coating of sawdust one to two inches thick kept wet for a period of from 10 days to two weeks is preferable to other methods for curing. Special care is necessary in the selection of sawdust in order to get a nonstaining product.

Hickory sawdust is most in demand for meat smoking, but that of oak, mahogany, maple, and other hardwoods is sometimes used.

Use of Sawdust and Shavings for Fuel

The largest part of the sawdust and shavings produced is used for fuel, and practically all of it is consumed at the points of production. That use will continue to be the chief outlet for such stock until it commands a price for industrial and other purposes sufficiently high to enable factories and mills to use other forms of fuel or electric power for plant operation.

Green sawdust and shavings require for best results, considerable modifica-

For Dependable Post-War Lumber
WINTON
IDAHO WHITE PINE
PONDEROSA PINE • CALIFORNIA SUGAR PINE
NORTHERN PINE • WESTERN WHITE SPRUCE
Producers Pine Woodcraft
WINTON LUMBER SALES CO. ★ Foshay Tower, MINNEAPOLIS 2, MINN.

44" McDONOUGH VERTICAL BAND RESAW

BELT OR MOTOR DRIVEN

Made left hand only.
Bearings: Heavy duty ball bearings.
Wheels: 44" diameter; 4½" face to carry 5" saw, taper bored.
Top Wheel Shaft: Alloy steel, 2¾" in bearings on each end.
Lower Wheel Shaft: Alloy steel, 3½" full length, supported on outside of wheel by hanger from column, to eliminate overhanging wheel.
Saw Strain: Sensitive knife edge type with gauge to indicate strain.
Top and Lower Guides: Quick opening hinge type.
Maximum Depth of Cut: 25".
Extreme Height from Floor Line: 6 ft. 3½".
Floor Space Required: 4 ft. 10½"x5 ft. 1".
Speed: 600 R. P. M.

Power Required: 20 H. P.
Saws: 5" wide; #19 ga.; 23 ft. 4" long, 1¾" teeth. Saws not furnished as regular equipment but carried in stock as extra for convenience of users.
Feed Rolls: Four driven rollers 4½" diameter with independent adjustment for alignment with saw. 20 to 75 lin. ft. per min.
Maximum opening 12½"—6¼" each side of saw line. Inside rolls flexibly mounted for gauge sawing.
Can be set for center or gauge sawing and tilt for bevel siding.
Feed Roll Drive Mechanism: Variable speed, self contained, friction drive mounted inside of column, exclusive on this resaw, eliminates danger of contact with large number of moving parts exposed on all competing machines.
Belt Drive Machine with 16"x8½" pulley: Net weight 5,000 lbs.; shipping weight, skidded and crated, 5,400 lbs.
Motor Driven Machine: with built-in 20 H. P. electric motor and "V" belt drive; net weight 5,800 lbs.; shipping weight, skidded and crated 6,200 lbs. Starting switches and controller not furnished.

Good Deliveries with Priority

Write for Complete Information

McDonough Manufacturing Co.

INCORPORATED 1888

EAU CLAIRE, WISC.

Shevlin Pine Sales Company

SELLING THE PRODUCTS OF
*THE McCLOUD RIVER LUMBER COMPANY
McCloud, Calif.
*THE SHEVLIN-HIXON COMPANY
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Member of the Western Pine Association, Portland, Oregon.

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(PINUS PONDEROSA)
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ROSS SERIES 70 CARRIER . . .
for those "hard to handle" jobs

. . . Ideal for Planing Mills—Remanufacturing plants—Wholesale yards. Rugged, fast, low priced. Economical and easy to operate.

Write for Bulletin 70C

The ROSS CARRIER CO.
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ROSS CARRIER COMPANY

PAUL B. BERRY
Grand Rapids 6, Michigan

If you can furnish any of the following (or anything else) write or wire me.

2 cars 12/4", prefer #1&Btr Soft Maple or can use 3" x 3" x 30" Clear

5 cars 2" x 2" x 30" Clear Rgh or KDS4S what have you, also 19"

10 cars 4 & 5/4" Soft Maple, Poplar, Gum or what have you, prefer #1&Btr

5 cars 8/4" #1&Btr QSG or Poplar

5 cars 3", 4", 6" Crating strips S4or2S

Can use KD, AD, SD, Rgh S4or2S

Interested in finished dimension.

DIAMOND HARD
MAPLE AND BIRCH
FLOORING

When you want reliable quality Maple and Birch flooring, order "Diamond Hard." Its good manufacture is your assurance of satisfaction.

J.W. WELLS
LUMBER COMPANY
MANUFACTURERS
MENOMINEE, MICHIGAN

tion of the combustion chamber and proper mixture of the material with larger forms of wood waste. About 50 percent of hogged fuel mixed with green sawdust or shavings prevents fuel from packing and provides proper draft for good combustion.

The actual heat value of a given weight of bone-dry wood or bark is nearly constant regardless of the nature of the material or species of wood, and is usually assumed to be about 8,600 British thermal units per pound. Woods containing resin have slightly higher fuel values, since resin yields more heat units than wood substance. Average coal has a heat value of about 18,000 B.t.u.'s per pound. Bone-dry wood, therefore, yields approximately ⅔ as many heat units as coal.

The bulk of sawdust consumed as fuel, however, is green and its fuel value is thereby greatly reduced. At northern mills green sawdust contains 50 to 60 percent of moisture and has only 27 percent the heat value of coal.

Gas Producers

Sawdust has been used to a small extent as a fuel in gas producers with considerable success. It is necessary, however, to mix with the sawdust about 50 percent of hogged fuel for best results. Recent developments indicate that a stove on a gas producer principle is entirely possible and economical. Wood gas producers are quite commonly employed for production of motor fuel in many European countries. Wood gas is commonly used for industrial and domestic purposes in those countries. It is an excellent fuel and we might hear more about it in the future.

Briquettes

The use of sawdust and shavings in the manufacture of fuel briquettes has only recently attained much prominence in this country. During the past few years equipment has been perfected for compressing sawdust and shavings into briquettes that hold together without artificial binders. These briquettes are now produced in large quantities.

The principal factors necessary for success in fuel briquette production are: A large and constant supply of cheap raw material, low production costs, and a good market for the briquettes at a fair price. Such conditions are found only in especially favored localities. In regions where fuel is relatively high priced and climatic conditions are such that only a small amount of heat is required during the greater part of the year, the manufacture and sale of sawdust briquettes may be found profitable. The most promising fields for the waste wood briquetting industry are the Pacific Coast region, the Southwestern States, Florida, and some parts of the Northeast.

Composition Products

(a) **Floors:** Sawdust is an impor-

VESTAL LUMBER & MFG. CO.
INCORPORATED

ARMY E NAVY
Awarded To Knoxville Plant

V

Sincere Wishes For A Cheerful Christmas and A New Year of Peace and Prosperity

KNOXVILLE, TENN.

SHIPPING POINTS: Knoxville, Tenn. -- Duff, Tenn. -- Sardis, Ga.
Arkansas City, Ark. -- Williamsburg, Ky.

SPRUCE
Sitka
SPRUCE

Old ways of logging have given place to the new. Mill methods have changed. But the high quality of Polson lumber never has changed. Sitka Spruce and Douglas Fir direct from our forests. Rail and water shipments.

POLSON LUMBER & SHINGLE MILLS
Division of Polson Logging Co. HOQUIAM, WASHINGTON

FIR
Douglas
FIR

Season's Greetings to all the Trade

W. T. CARTER & BRO.

HOUSTON, TEXAS

Southern Pine & Hardwoods

Another Certified WESTERN PINE TREE FARM

This sign is posted on properties certified as Western Pine Tree Farms.

YES, there are Tree Farms in the Western Pine region. The number of company-owned "farms" certified by the Western Pine Association and dedicated to growing commercial forest crops is steadily increasing.

This region has large reserves of old-growth standing timber. And the accelerated growth on harvested lands, improved manufacture and laboratory research assure far beyond our time an adequate lumber supply of the soft-textured Western Pines.*

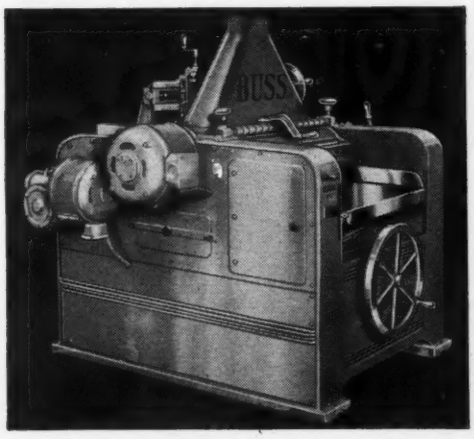
WESTERN PINE ASSOCIATION

Yeon Building, Portland (4) Oregon

*Idaho White Pine *Ponderosa Pine *Sugar Pine

*THESE ARE THE WESTERN PINES

BUSS *Type 4-L*



THE KIND OF PLANER YOU HAVE LONG WANTED!

Big enough to handle all of a lumber company's requirements. Built for the precision accuracy formerly obtainable only with the larger machines. A husky producer with Inclined Bed and many patented features promoting convenient, time-saving operation and highest quality work. Priced way below the larger machines. Write for details.

BUSS MACHINE WORKS
238 Eighth St. Holland, Mich.

YOUR CUSTOMERS WANT

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ELECTRIC HANDSAWS . . .

...why don't YOU sell them?

A lumber yard is the natural outlet for Speedmatic Saws because every lumber buyer needs them now or will need them soon. In your own yard, where customers will see it work, SPEEDMATIC will pay for itself doing many jobs faster, better than they've ever been done before—automatically providing demonstration facilities hard to match elsewhere.

Speedmatic does the job quicker, better, AT LESS COST!

Just the right weight and handiness —plus all the power you'll ever need. It's perfectly balanced for one-hand operation in any position. Extra-wide shoe assures steadier, truer cut. Blade enters cut at 7,000 r.p.m. — so fast it practically feeds itself. Write for dealer proposition on SPEEDMATIC and other top-notch Porter-Cable electric tools.

PORTER-CABLE
Machine Co.
1600-12 N. Salina St., Syracuse 8, N. Y.

Season's Greetings

WOODS LUMBER COMPANY

Memphis, Tennessee

Band-Sawn SOUTHERN HARDWOODS

Mills: Memphis, Tenn. Clarendon, Ark. Greenville, Miss.

"Conveyorize" HANDLING IN YOUR YARD

Save space—time—costs—release men for productive work—handle lumber with conveyors.

Write for special bulletin A.L.-124, describing Standard Conveyors designed to speed and cut the cost of handling in lumber and building supply yards.

STANDARD CONVEYOR CO.

General Offices:
No. St. Paul, Minn.

STANDARD

Lindsey 8-Wheel Tractor Wagons

are ideal for tractor logging. They are used singly or in trains.

Lindsey Wagon Co., Laurel, Miss.

Sole Manufacturer

tant ingredient in quite a number of flooring compounds. The mineral base of most of these substances is magnesium oxychloride. Probably the most common filler is wood, chiefly in the form of sawdust. There is considerable variation in the type, kind, grade, and proportion of sawdust used in making composite flooring. Chiefly, however, hardwood of rather fine mesh (20 to 40) is used. The proportions of sawdust in the mixture may vary from 4 percent to 70 percent and more. One type of flooring, in which 70 percent sawdust is reported as used, employs kiln-dried hard maple or hickory sawdust of 20 mesh for the top layers and coarse softwood sawdust for the base. Another type of composition flooring is said to contain 85 percent sawdust.

Sawdust is often used in composition floors that are to be covered and to which it is desired to nail the covering. The sawdust makes the floor light and porous so that the nails can be readily driven into it.

(b) Concrete Products: Sawdust and shavings are used to some extent as fillers in various types of concrete-like products. Concrete of these types is light and porous, holds nails and screws well, and has fair insulating qualities. One concern uses mineralized sawdust (sawdust treated with iron compounds) in making a light weight concrete. About ⅓ to ½ of the weight of the material is sawdust. The product is said to be highly wear resistant, fire resistant, a non-conductor of sound, and more comfortable to walk on than concrete. It can be sawed, nailed, screwed, and polished. Sawdust-concrete floors are sometimes laid where it is desired to attach wooden construction by means of screws and nails.

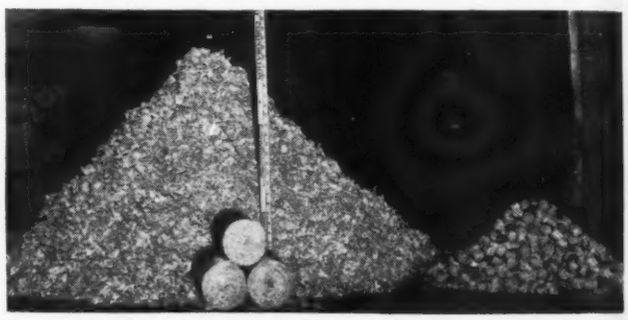
The use of sawdust in place of sand in the making of cement barn floors has also been found, in at least one instance, to produce a floor which is warmer and less wearing on the hoofs of the cattle than ordinary cement, and the report states that after several years the floor was still in as good shape as when first laid. Reports of other similar concrete work, however, are not so satisfactory.

(c) Cast Products: The number of products made by casting mixtures containing sawdust is increasing. Burial vaults are made of sawdust concrete. Tile, fire brick, shingles, and plumbing ware have also been cast. One firm making the items noted uses 80 to 90 percent sawdust in the mixture. The cast products are said to hold nails well, can be sawn, are waterproof, and fireproof up to 2,600° F. Other cast articles are refrigerators and floor marble.

(d) Stuccos and Plasters: There are several composition stuccos and plasters on the market that use sawdust as fillers which are lighter and more porous than usual. They can be nailed without damage, and are said to have better insulating qualities than the ordinary product.

The use of sawdust plasters and stuccos is not increasing greatly, and the chances of any considerable development along these lines are not very promising.

(e) Gypsum Compositions: Sawdust is used in the manufacture of a number of commodities of gypsum. Sawdust decreases the weight of the products, makes them more porous, increases their insulating qualities, softens the material so that it can be nailed and sawed, and lessens the cost of the finished articles. The following are typical gypsum products in the manufacture of which some sawdust may be used: Interior partitions, floor insulation, wall insulation, wall boards, cast products of a variety of kinds, and roofing material.



Comparison of volume of wood waste material before and after compression into fuel briquettes.

Sawdust and shavings used in mixtures with gypsum are usually light colored, light weight, and of non-staining species.

(f) Clay Products: In the manufacture of porous clay bricks and tile, it is necessary to mix with the clay a substance which will be consumed during the burning and leave the finished product filled with fine cavities or pores. For this purpose either sawdust or finely chopped straw is used. The sawdust should be dry and sifted to produce uniform results.

(g) Moulded Articles: Sawdust and shavings ground to the proper fineness are used in making doll heads, radio horns, display novelties, insulators, jewelry cases, thermometer backs, tiles, furniture ornaments, etc. For radio horns fibrous sawdust of Port Orford cedar is particularly desirable. The wood particles are mixed with a suitable binder, placed in moulds of the desired forms and subjected to heavy pressure.

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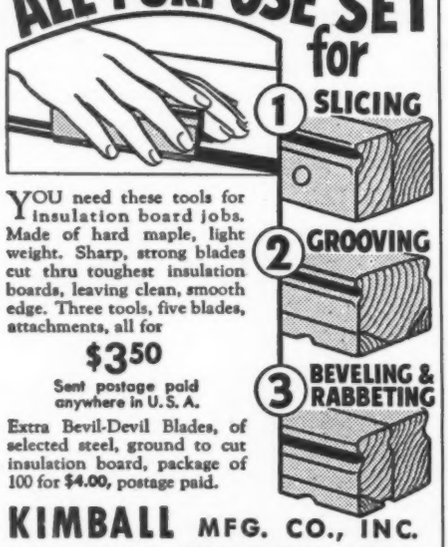

YOU need these tools for insulation board jobs. Made of hard maple, light weight. Sharp, strong blades cut thru toughest insulation boards, leaving clean, smooth edge. Three tools, five blades, attachments, all for

$3.50

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KIMBALL MFG. CO., INC.

1709 GREENLEAF ROYAL OAK, MICH.

80 to 85 percent by weight of the materials used is sawdust, are being developed by several laboratories.

(h) Artificial Wood: Composition boards said to have properties of wood and reputed to act in use like ordinary lumber have been made, but so far as we know they are not marketed commercially.

A typical mixture of this kind is: Sawdust 33 percent; paper waste 20 percent; casein glue 22 percent; limestone or chalk 10 percent; water 15 percent. The proportions are varied somewhat with the type of product. The ingredients are ground together to make a uniform mixture, then moulded and dried. The board can be reinforced by placing pieces of wood in the mould.

Wood Flour

The name "wood flour" is applied to a number of different kinds of finely divided wood. Very fine grades of sawdust, such as those produced on sanding machines, are often known as wood flour. Commercial wood flour, however, is produced by specially made mills of which there are several types.

Wood flour is made chiefly from white pine shavings and sawdust. About 75 percent of the domestic product is of that species, and over 60 percent of the total volume is made from the wastes mentioned. The present requirements of industries using the bulk of wood flour production are for light colored, light weight, nonresinous, fluffy, highly absorptive stock. There are no mechanical difficulties involved in the production of wood flour from hardwoods, but the demand for such stock is limited. (See May 13, 1944, American Lumberman, p. 213.)

Chemical Outlets for Wood Waste

The chemical uses of wood waste will not be touched upon specifically as they have been covered in past articles. It is true that chemical outlets offer a great hope for waste utilization but in many instances the small lumberman is not in a position to undertake such developments because of lack of capital, of sufficient sawdust, and especially of the "know how." Associations such as the Northeastern Wood Utilization Council are trying to bridge this gap.

In hardwood distillation, about 70 percent of the raw material is woods and sawmill waste. Small sized pieces are not very desirable and sawdust is usually of no value. The commonly used species are beech, birch, maple and oak.

Waste wood offers excellent opportunities for efficient operations in the manufacture of wood pulp. Waste of various types has been used in paper making for a number of years. At present this consists largely of spruce and hemlock slabs, butt cuts, and other large pieces. The hemlock is frequently cut from peeled logs, and hence is free from bark. There are several mills in the South which operate largely upon southern yellow pine mill waste. These employ the "kraft" or sulphate process, in which the presence of some bark is not objectionable for most of the products. In the other chemical processes, namely, the sulphite process and the soda process and in the mechanical or ground-wood process, the bark must be removed entirely before the wood can be pulped. This is a serious obstacle to the use of waste because of the fact that the removal of bark from slabs and other irregular forms is more difficult than its removal from roundwood. Another drawback is the fact that the handling of slabs in the wood room of the average pulp mill and their conversion into chips is more expensive than with roundwood. In order to obviate handling costs in wood rooms not especially equipped for handling waste and to save in freight and other items, certain operators are now chipping the waste at the sawmill and shipping the chips to the pulp mill.

Recently wood waste has assumed some importance in the production of fiber boards, particularly insulation boards. New pulping processes have been or are being developed which appear very efficient in the utilization of such materials and offer promise of greatly increasing the consumption of wood waste for pulp products. The same processes are also applicable to the by-products of the various wood extraction processes — particularly to spent chestnut chips from the tanning extract industry.

Several sulphite pulp mills on the Pacific Coast are using hemlock woods and sawmill waste in the production of newsprint and other grades of paper that will admit some dirt and discolorations in the paper. Species which are more or less commonly used

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Yellow Pine and Hardwood Lumber

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BISMARCK, MO.

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POPE & TALBOT

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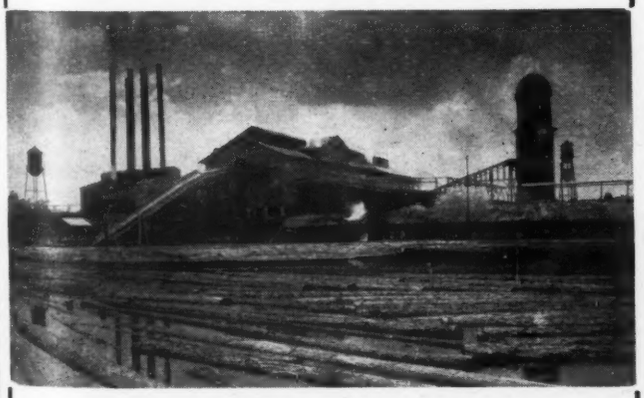
Holiday Greetings



We earnestly hope for an early return of conditions which will permit us to send you also some of our fine quality Southern Pine and Hardwood lumber including our Oak, Beech and Pecan Flooring. Now co-operating to the maximum extent possible in the War effort, despite many adverse operating factors, we are eager to begin resumption of regular service to the trade. Tremont plans to be here permanently to serve its many customers.

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in the manufacture of pulp are as follows:

Sulphite process

Spruce
Hemlock
True firs

Soda and semi-chemical processes

Poplar
Maple
Beech
True firs
Cottonwood
Pine
Gum
Birch
Douglas fir

Mechanical process

Spruce
Hemlock
Balsam fir

Sulphate process

Hemlock
Spruce
Pine
True firs
Tamarack
Douglas fir

Charcoal

The production of charcoal in brick and pit kilns for local use consumes considerable wood in some localities, a large portion of which is wood waste. The industry is well developed in the Southern States where southern yellow pine is the principal species used. In northern localities hardwoods comprise the bulk of the raw material. While small round pieces are used in pit burning, wood split from sticks 6 inches and over in diameter is preferred.

A small portable charcoal kiln has been devised for use in woodlot and other small scale operations. It is reported to be very practical and has been in use for several years in the East. Other developments by the Connecticut Agricultural Experiment Station are worth watching in this direction.

Oils

The production of various wood, bark, and leaf oils is a small industry which has been in existence for many years and which seems to have slight chance for appreciable expansion. Some of the oils are spruce oil, eucalyptus oil, cedar wood oil, and birch bark oil.

Mechanical Uses for Wastes of Large Size

Mechanical uses of wood waste cover a very wide field and include all those in which the material is converted by further manufacture into wooden articles. The usual product made is small square-edged material—"dimension stock," and "squares." Occasionally finished and semi-finished commodities are made from wood refuse at the point of waste production.

Dimension stock and squares can be made from small, crooked, knotty, and defective logs, from tops, and from large branches of trees. Slabs, edgings, and trimmings, and to a less extent factory wastes are also made into dimension stock and squares.

During the manufacture of softwood yard lumber large quantities of material in lengths under eight feet now go to waste outright or are so used as to yield but a fraction of their real value. The bulk of these "shorts" are four and six feet long, since odd lengths are not commonly made in softwood lumber manufacture. Short length lumber occurs as rough square-edged stock, chiefly as a result of taper, crook, and defects in logs and as surfaced, worked, or patterned material from planing mill operations.

Short length stock constitutes approximately five percent of the total volume of softwood yard lumber marketed under the regular specifications. It is thought that if all the suitable material available at sawmill operations under present practice were utilized in the production of short lumber such stock would constitute at least ten percent of the total volume of softwood yard lumber produced.

Hardwood lumber is marketed in the regular grades in lengths as short as four feet. Pieces up to four feet long and at some mills longer pieces are quite commonly wasted. A great deal of this short length lumber is clear material and could be used to advantage in many of the hardwood-using industries. More complete utilization of short lengths in hardwoods is very desirable, and if carried out to the limit under present manufacturing practice, would help very materially to conserve our stand of hardwood timber.

Box and Crating Stock

Low grade lumber, slabs, edgings, short stock of both hardwoods and softwoods are sometimes made into box shooks and crating material. This is done at the mills or the material is trucked or shipped to box factories

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RED DEVIL No. 2 Triangle Points are now packaged in 5¢ and 10¢ size handy packages which permit dispensing of a few at a time, preventing wasteful loss caused by "loose" containers. Triangle Points come in 6 standard sizes and can be purchased in ¼ pound to 100 lb. quantities.

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Greetings...
To all good lumbermen at this happy Christmas Season. May the New Year bring Peace and the opportunity to again efficiently serve our customers as we did for so many years before the war.
Mauk-Seattle Lumber Company
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ESTIMATED PRE-WAR MECHANICAL UTILIZATION OF LARGE SIZED WOODS, SAWMILL, AND FACTORY WASTE

Class	Wood used which was waste Percent	Total waste used annually in M feet b.m. (prewar)
Lath	95	620,000
Shades and map rollers	50	39,640
Chairs and chair stock	15	60,000
Matches and toothpicks	5	4,270
Signs and supplies	10	700
Woodenware and novelties	25	101,000
Picture frames and molding	20	13,095
Boot and shoe findings	15	9,936
Sewing machines	15	9,000
Toys	25	7,250
Brushes	25	3,250
Brooms and carpet sweepers	20	445
Boxes and crates	10	454,800
Furniture	5	52,500
Planing mill products (shorts)	1	134,000
Industrial uses (short lengths)	1	125,700
Construction uses (short lengths)		
Dowels	10	1,200
Hardwood flooring	3	21,960
Skewers and butcher blocks	5	150
Handles	3	8,400
Farm equipment	5	7,945
Seating	2	1,380
Wood turning	25	52,100

Source: U. S. Department of Agriculture.

for conversion. The enormous volume of box and crating stock consumed suggests that suitable waste and low grade material can be used for those items to the limit, so far as such operations may be profitable.

Excelsior

Excelsior is commonly made from 18-inch bolts of fairly large-sized stock chiefly of basswood, aspen, cottonwood, and southern yellow pine. Considerable material of the proper species suitable for excelsior stock can, no doubt, be made from woods waste. This is particularly true of short clear pieces of fairly large size unsuited for log use. Excelsior can also be made from suitable sawmill and factory waste. It has been found possible to make excelsior from square-edged pieces as small as 1 x 1½ x 6 inches. The utilization of waste by conversion into excelsior is limited because of the relatively few species from which that product is made.

The Future of Waste Utilization

The lumber industry is just beginning to realize the value to itself of research on waste utilization. Only recently several lumber companies have established research laboratories with staffs working mainly on waste utilization. Synthetic construction materials made from non-merchantable species and the pressing of inferior softwood lumber into hard, dense, attractive building materials, as well as plastics, are receiving special attention by the industry.

The chemical use of wood cellulose has expanded tremendously during the last two decades—a period during which the use of logs and other sawed products has decreased considerably. This fact gives a clue to the future of the chemical utilization of wood. The conviction is growing in the lumber industry that its future prosperity depends much upon carrying manufacture as far as possible, thus getting away from the low-price level which is almost universally associated with basic materials. This will involve careful integration and will extend the industry into the domain of chemical manufacture. Research will transform wood into a raw material analogous with our conception of mineral ores and suitable for conversion into other substances and goods. Forests will be considered producers of cellulose, tannins, lignin, resins, etc., while their natural form will be less and less directly used. Forests may be cropped several times in a generation and yield a much larger total of industrial material than at present.

The amount of wood which is used at present for chemical conversion in the United States is about ten times smaller than the amount used for mechanical purposes; however, this amount may be easily doubled in the future, especially on account of the fact that the quality is not very important in the case of chemical conversion and most wastes could be utilized. Some nations have made wood their most essential raw material, making up deficiencies in food, clothing, shelter, war essentials and motor fuel. We have not outgrown the "age of wood," in fact, research shows that we are only growing into it.

By means of utilizing wood waste both in a mechanical and chemical manner, lumber will be cheaper and able to compete better with other engineering materials. On the other hand, second growth timber and wood which can be considered of a low grade for structural purposes can be used to make chemically converted products like mineral ores. By combining forestry, chemistry and industry, we shall be able to face the future with no fear.